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WILDLIFE MONITORING REPORT FOR

ELK AND DEER WINTER RANGES

WITHIN THE GUNNISON RESOURCE AREA

Bureau of Land Management

Gunnison Resource Area

Montrose District, Colorado

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
GUNNISON RESOURCE AREA
216 NORTH COLORADO
GUNNISON, COLORADO 81230

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:

Dear Reader:

This document represents five years of intensive monitoring efforts in hopes of furthering our knowledge of wildlife habitat resources within the Gunnison Resource Area. The fundamental reason for increasing emphasis on monitoring was generated by the Grazing Environmental Impact Statement and the Land Use Plan completed in 1979-80. It is critical that we monitor these decisions that have set direction for wildlife habitat management within the resource area to analyze the results of our actions. The report is the first half of a two part effort to collect information concerning big game and its habitat within the resource area. The second half, which is in the process of being completed, will be ready for review by 1990.

This report is intended to provide information to BLM personnel, local state agencies, permittees, and other interested individuals on elk and deer resources and their interactions with livestock and other resource area activities. The report outlines specific monitoring objectives, procedures for data collection, data analysis and interpretation, and management recommendations. Another objective of the report is to take the reader step by step through the process so they know what we did and why we did it. Too many times in the past individuals have not left detailed records explaining their reasons for proceeding the way they did or their results.

Information in the document has been accepted and fully supported by this office as accurately representing big game use on our winter range. I feel the information in this report brings to light many concerns that individuals may have had about our wildlife resources. Several recommendations are made in the report. We will be looking at all of those recommendations to determine their value for future management of wildlife habitat in our ongoing Resource Management Planning effort. Decisions on any implementation of those proposals will take place as part of that process.

I would like to thank the author for all the work and effort he put into this endeavor and other individuals who helped collect information. If you have any questions, please feel free to contact our office.

Barry Tollefson
Area Manager

1/17/85
Date

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
GUNNISON RESOURCE AREA
216 NORTH COLORADO
GUNNISON, COLORADO 81230

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6500

Memorandum

To: Area Manager, Gunnison Resource Area

From: Gunnison Wildlife Biologist

Subject: Wildlife Monitoring Report

At the completion of the Management Framework Plan and the Grazing Environmental Impact Statement, there were concerns from Washington that information gathered for this effort may not have been enough to make accurate decisions. They then directed resource areas to collect additional information over the next several years while implementing the grazing decisions. At the end of 1982, the wildlife program initiated an intensive monitoring effort to evaluate many decisions that were made concerning wildlife habitat management. Other documents that generated the monitoring effort include the Gunnison Habitat Management Plan, ORV Plan, and the Gunnison Monitoring Plan.

The following report discusses and outlines our monitoring procedures, locations surveyed, and objectives, findings and recommendations. Since the majority of the resource area is critical winter range for elk and deer and most of the controversial decisions involved big game and livestock, the monitoring effort and the information in this document attempt to evaluate many of the conflicts.

Several elements and resource conflicts were monitored and evaluated during this process. They include utilization in riparian areas, existing elk and deer numbers and available forage, range conditions in relation to wintering wildlife needs, and elk competition with livestock for spring forage. This report is the first half of a two-part effort and only concentrates on those winter ranges north of Highway 50 as this area is considered one of the most critical winter ranges around Gunnison and conflicts are high. The second half, which will concentrate on winter ranges south of highway 50, will be completed in FY89 or 90.

I hope you find the report and the information in it helpful when making future management decisions. I tried to make the report specific, but could not include all the raw data because of size. Those wishing further detail and site specific information will have to contact our resource area since this is where the information will be stored.

Joseph A. Capodice 12/6/88
Area Wildlife Biologist

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Wildlife Monitoring Report for Elk and Deer Winter Ranges Within the Gunnison Resource Area

by
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November 21, 1988

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ACKNOWLEDGEMENTS

The information in this document was collected by several individuals including permanent staff and summer temporaries for which I am grateful for their assistance. I would like to express my appreciation to Sandy Hayes, for her work in helping me collect information and her assistance and contribution in selecting the utilization monitoring methods used during this time. Her recommendation to use the Key Forage Plant method enabled us to collect the information needed within our limited time frame.

I would like to thank Terry Reed for his support in this effort. During his tenure as Area Manager in Gunnison, he provided comments and assistance through the entire process and recognized the need for such a report.

Finally, the many hours spent typing and retyping this report by the clerical staff at the Gunnison Resource Area, namely Cheryl Madison, Peggy Dobie, and Chris Leahy, were greatly appreciated.

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I. INTRODUCTION

Over the past years, within the Gunnison Resource Area there has been an increasing concern over numbers of elk and deer using public land winter ranges Concern is over forage utilization between elk and livestock and the impact this could have on critical winter ranges and livestock spring ranges. The major area of concern is north of Highway 50, east and west of Gunnison, including game management units (GMU) 54, 55 and portions of 551.

As a result of the 1978 Grazing Environmental Impact Statement and the MFP planning decisions, BLM made recommendations to reduce elk numbers in GMU 54 by 25%, GMU 55 by 9% and livestock licensed preference by 9%. These reductions were based on undesirable range conditions attributed to high grazing levels and season of use. Recommendations to reduce livestock generated a great deal of controversy from local livestock operators. Elk winter on sagebrush-grassland habitats which are used by cattle during spring and operators felt the declining range conditions were a result of heavy elk use on grasses during this spring period. This use was felt to be damaging forage needed by cattle and therefore adversely affecting range conditions.

Specific concerns related to numbers of big game animals on winter ranges. Utilization studies completed in 1978 revealed levels of use by elk and deer on important winter forage higher than desirable, especially in game management units north of Gunnison. However, the Colorado Division of Wildlife disagreed with these findings and felt that elk numbers did not exceed available forage. Nevertheless, elk reductions were made by the Division north of Highway 50 at the request of BLM.

In 1982, a Habitat Management Plan was completed for the resource area and was the first step in developing intensive management projects and goals for the area. The HMP served to prescribe land management and related species management guidance for the mutual benefit of wildlife and other resources.

As a result of the conflicts method above, the MFP decisions, objectives in the Habitat Management Plan, and the ORV plan, the monitoring program has focused on addressing these conflicts as well as monitoring our decisions and recommendations.

II. OBJECTIVES

Since the spring of 1983, the Wildlife Habitat Monitoring program has focused on big game use surveys, actual use, trend studies, and elk and livestock conflicts. The majority of the work has centered on "I" allotments and other conflict areas such as critical wintering areas and important livestock spring ranges. Efforts were concentrated on these areas because the quality of habitat in these areas dictates the herd condition and size. Summer habitat is not a limiting factor. The preliminary objectives of the monitoring studies are listed below:

1. Establish actual use numbers for elk and deer.

2. Determine elk use on spring grasses prior to May 15th.

3. Determine use by big game on key browse species.

4. Determine the utilization and influence of elk and deer on riparian areas.

5. Determine elk distribution patterns on winter ranges from December 15 to May 1.

6. Determine key use areas within the winter ranges.

7. Determine snowmobile activity influence on elk distribution patterns.

III. MONITORING

A. Strategy

In past years, surveys were randomly conducted over the entire resource area in an attempt to collect information on all areas. Numbers of transects varied depending on the number of temporary employees hired for the year. In an effort to inventory the entire resource area, only a few transects were completed for an entire game management unit. As a result, there was a concern that sufficient transects were not being conducted within the different game management units to truly represent the entire unit.

Therefore, in 1983, to intensify this information, it was decided to concentrate efforts in the more critical and controversial winter ranges north of highway 50 extending from West Elk Creek on the west to Big Horn Gulch on the east. This includes game management units 54, 55 and portions of 551 north of highway 50. This area is considered one of the most critical winter ranges in the Gunnsion area. It is small, restrictive, and elk and livestock conflicts are preceived as being high.

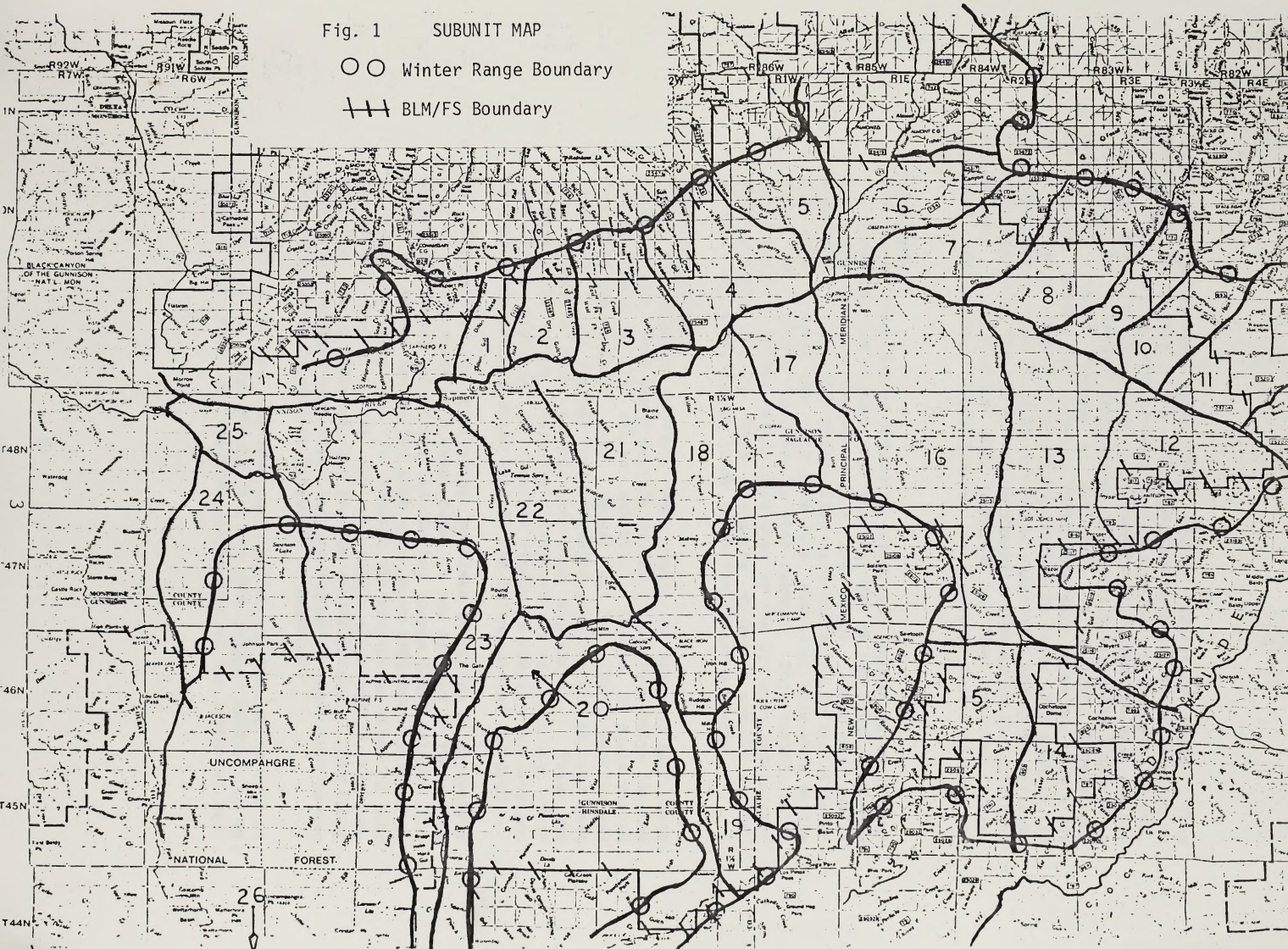
In addition to areas north of highway 50, another location near Cimarron was selected to be intensively monitored because heavy use has been observed there for the past several years. Therefore, most of the information and results presented in this paper will pertain to the areas mentioned above.

Working with the Division of Wildlife, game management units within the Resource Area were divided into twenty-six subunits. Each subunit has been given a number and boundary and they apply only to the Gunnison Resource Area and not the Forest even though winter ranges extend into the Forest in some locations. For specific subunit locations, see Figure 1. These subunits are an attempt to reduce the

Fig. 1 SUBUNIT MAP

○○ Winter Range Boundary

⊣⊣ BLM/FS Boundary



large game management units into smaller inventory areas. They correspond to survey units the Division uses to record information during their aerial surveys when determining post-season populations. Subunits were not broken out by allotments since game animals are not restricted by allotment boundaries. This would have also resulted in many small units making it difficult to collect information. Fortunately, after the subunit boundaries were selected, only a few units had more than one or two allotments in them. For example, in game management unit 55 there are three allotments and after dividing it into subunits the GMU had three subunits similar to the allotment boundaries. Information was gathered in five critical areas, including actual use, distribution, utilization, season of use, and trend.

1. Actual Use

   The first step was to establish actual use figures in an attempt to document the number of animals out of the total herd were wintering in the resource area and where. Each year aerial counts and sex ratio information were collected by the Division for each subunit and, with this data, estimates were made on the number of animals wintering in each subunit. This number, which is submitted to our office each year by the Division represented that portion of the herd wintering within a subunit on BLM, private, and Park Service lands below the Forest boundary.

2. Utilization/Trend

   Using the subunit concept, each unit was assigned sufficient survey plots that would provide enough information about the use taking place on an entire subunit. Number of plots varied depending on subunit size, amount of key forage species and condition. All surveys were completed prior to May 15, the date when livestock were turned into the allotments. This was necessary to avoid confusing livestock use with elk use. This time frame resulted in a narrow window to complete utilization surveys after the elk moved back to the Forest around mid-April.

   To help solve the continuing problems of trying to accurately monitor large areas in a short time, it was decided to forego the extensive browse method and use the key forage plant method. The extensive browse method had been used up to 1984 but was found to be time consuming and it limited the monitoring sites to only heavy use areas. With the key forage plant method, the same accuracy can be achieved, but for the entire subunit. This would also keep methods consistent between resources since this is the same method used to collect livestock utilization.

   In riparian areas, the stem count method was used up to 1984 to monitor use on key shrubs but was also dropped because, in my opinion, it gave an inflated impression of the amount of use.

For example, the system monitors number of twigs being used on a plant and does not take into account the amount of use on these twigs. Therefore, if seven out of ten twigs on a plant had the tips eaten off and the majority of the new growth still remained, use would still be recorded as 70% instead of slight.

In addition to monitoring shrubs, efforts were made to monitor use on grasses since none of the previous surveys had done so. During development of the grazing EIS, livestock operators felt that elk were using the grasses heavy in the spring resulting in over grazed spring ranges and poor range conditions.

To study the effects of elk grazing on grasses in riparian areas, a two-cage monitoring system was established. These are small, cone-shaped exclosures used to exclude grazing from sample plots. Two were used in an attempt to record information on cattle use versus elk use. In late fall, after cattle are removed from an allotment, a cage is placed in a riparian area protecting grasses through the spring growing season. Then, prior to May 15, these plots would be surveyed to compare growth on both inside and outside of the cage. This would indicate elk use on spring grasses during the growing season.

After the elk leave and a day or two prior to May 15th, a second cage would be placed next to the first, excluding cattle grazing. Therefore, a comparison could be made between one cage having no grazing, a second cage showing the effects of elk grazing, and the area outside of both cages showing the effects of all grazing.

Trend is another important component of winter ranges being monitored. In 1979 and continuing through 1981 frequency transects were established in each allotment. In 1982, study locations were reevaluated to determine if sufficient plots had been established within allotments so the information collected would be a good representation of the entire area. As a result of the reevaluation, additional trend transects were added to several allotments.

Since it takes years for winter ranges to show any change, the transects will be reread on a three to five year schedule. However, attempts have been made to record apparent trend at the time use surveys are conducted. Apparent trend is based on analysis of the form class of existing plants and ratio of young to old individuals in the community. Form class is based on the following criteria:

<u>Form Class</u>
1-all available, little or no hedging
2-all available, moderately hedged
3-all available, severely hedged
4-partly available, little or no hedging
5-partly available, moderately hedged
6-partly available, severely hedged
7-mostly unavailable
8-unavailable

3. Distribution/Season of Use

Another important component of the monitoring studies was to determine elk and deer distribution patterns and season of use. Beginning in 1983 and continuing through 1986, aerial flights were conducted periodically through the wintering period, from December 15 to approximately the end of April.

The number of flights conducted was based on winter snow conditions. Since snowfall influenced animal distribution on winter ranges, flights were scheduled after major changes in weather conditions. Animals did not appear to shift use patterns a great deal unless forced to by snow conditions.

Flights concentrated within the wintering area from Dillon Pinnacles to Quartz Creek. Since the number of flights per month was dependent on funding for the year, scheduling was critical. Therefore, schedules were based on several factors: 1) a flight was always conducted near the middle of December to determine how early the animals move down to the winter ranger; 2) the next several flights were based on snowfall and weather conditions and 3) a flight was always conducted near the end of April to monitor whether animals were migrating to their summer ranges or remaining to take advantage of spring feed.

At first, attempts were made to record deer sightings and plot them along with elk, but after several flights, it was apparent that they were too small to see from a fixed-wing aircraft. Therefore, observations plotted on maps in Appendix 1 are only elk distributions and numbers. It must be understood that our aerial surveys were not attempting to count every animal. This is the job of the Division of Wildlife. Instead, our efforts were to monitor use areas and seasons.

As part of the aerial flights, snowmobile use in relation to the location of wintering animals was recorded. In 1983, the Resource Area ORV closures on winter ranges became a controversial issue. Most snowmobilers in Gunnison felt they do not influence big game on winter ranges and did not cause any undue hardship to wintering animals. As a result of public pressure, the initial ORV plan which closed these wintering areas to motorized use from December through March, was modified. Under the new ORV plan, winter ranges would be closed only on an as-needed basis. Closures could occur under severe winter conditions when increasing snowmobile activity around important feeding habitat prevented animals from using critical areas or resulted in harassment.

Winter of 1983-1984 was severe enough to close the ranges to snowmobile use; however, it was felt that this would be a good opportunity to observe snowmobile activity and its influences on distribution patterns, so the winter ranges remained open. During the flights, elk and deer locations were plotted along with areas used by snowmobiles. These observations were then compared on a monthly basis in an attempt to determine if there was a direct displacement correlation between snowmobile use areas and elk and deer movement patterns. The timing of snowmobile use is very sporadic and is tied entirely to snow conditions.

B. Results

1. Actual Use

Listed below in Table 1 are the actual use figures submitted by the Division of Wildlife from 1983-1987. These figures do not represent the entire population but only those animals wintering on BLM, NPS, and private lands below the National Forest.

Table 1. Actual Use Figures

GMU	83/84		84/85		85/86		86/87	
	Elk	Deer	Elk	Deer	Elk	Deer	Elk	Deer
54	2460	1660	1180	630	1235	705	1150	500
55/551	950	2070	580	1185	615	1185	380	790

Snow conditions are an important factor in determining the number of animals found within a subunit at any one time. During years of light or average snowfall, the majority of the elk remain at approximately 8,500 to 9,000 feet, tending to concentrate along the BLM/Forest Service boundary. During similar conditions, deer were occupying the lower elevations of the winter range along a 1 to 1½ mile wide strip paralleling highway 50. However, during heavy snow years as in 1983-1984, elk moved to the lower elevations where snow depths are much lower. This in turn, may have forced deer into areas of deeper snow or onto poorer sites.

Actual use figures submitted by the Division show that 42% to 81% of the elk and 15% to 34% of the deer populations in GMU 54 will winter in the Resource Area west of Gunnison, while 23% to 45% of the elk and 38% to 65% of the deer populations in GMU 55 and 551 will winter in the Resource Area east of Gunnison. The higher percentage figures represent the severe winter of 1983-1984, while the lower percentages represent average winters.

From actual use figures, the amount of forage used within each game management unit can then be compared to the Bureau's allocations. These allocations were based on acres of public land and do not take into account the forage animals obtain from private, state and park lands.

AUM's allocated apply to those animals wintering from December 15 to May 15. Table 2 shows the AUM's allocated and used by game management unit. The 1983-1984 forage use calculations take into account the Division of Wildlife's feeding program and has been adjusted accordingly. To calculate AUM's used during non-feeding years, multiply the number of animals by the months they spend on the winter range; then, divide by the number of animal units (Cow=1, Elk=1.25, Deer=4). Formula: AUM's used:

$$\frac{\text{number of animals x number of months}}{\text{animal units}}$$

In this case the number of months is always 4, to reflect winter use.

Table 2. Forage Allocation and Use

GMU	AUM's Allocated from BLM		83/84 AUM's Used[2]		84/85 AUM's Used[2]		85/86 AUM's Used[2]		86/87 AUM's Used[2]	
	Elk	Deer	Elk	Deer	Elk	Deer	Elk	Deer	Elk	Deer
54[1]	2047	1661	1968	622	3776	630	3592	705	3680	500
55/55[1]	2307	1091	760	776	1856	1185	1968	1185	1216	790

[1]AUM's allocated in each GMU comes from BLM lands only. In GMU 54, more than 50% of the winter ranges in this unit are private, state and Forest Service lands and the percent of the AUM's consumed on these lands is not known.

[2]This is the calculated AUM's used by all the animals wintering below NFS boundary. See Figure 1. Not all the AUM's used came from BLM lands.

In 1983-84, the state began feeding elk and a limited number of deer on December 27, 1983 and as winter conditions worsened, deer feeding increased. Although animals were on the winter ranges, availability of native forage was limited because of snow conditions. Therefore, the table below shows how the 1983-84 AUM's were calculated using different time lengths instead of the standard four month period.

Game Management Unit	Elk	Deer
54, 55, 551, 66	1 month	1.5 months
67	1 month	2 months
64, 65	2 months	2 months

Game population numbers especially elk and their influence on livestock have been a concern of several local ranchers. They feel the numbers are too high and are always increasing. On the other hand the Division of Wildlife has established long range herd goals for the Data Analysis Units (DAU) for the Gunnison Valley. According to a DOW memo dated April 26, 1985, the herd goals for the area consist of the following:

	DOW Long Range Herd Goals	
	Elk	Deer
GMU 54	3000	4800
GMU 55/551	3000	5000
GMU 66 & 67	3000	6800

In 1978 at the height of the controversy, elk numbers were at their highest since counts have been kept for the valley. At the completion of the inventories in 1978-79, BLM had concerns that elk numbers may be too high for the available forage. The Bureau requested the Division to reduce elk numbers by 25% in GMU 55 and 9% in GMU 551. Figures 2 and 3 below compare DOW's long range herd goals, the number of animals wintering in the Gunnison Resource Area below the National Forest by year, and the total population by year.

FIG. 2

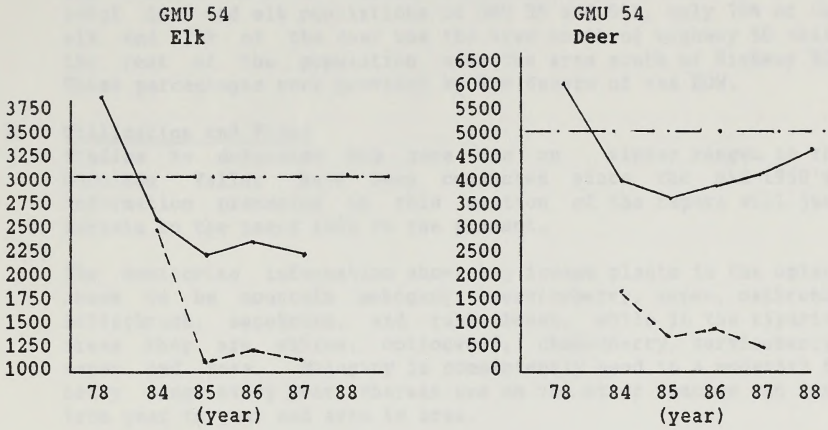
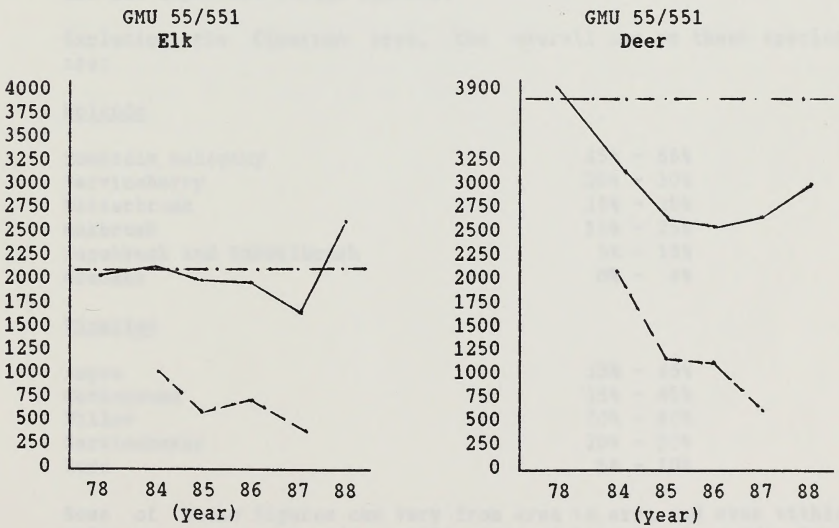


FIG. 3



Elk and Deer Populations ————————
# of Elk and Deer Wintering in R.A. below N.F. ----------
DOW Long Range Population Goal —·—·—·—·—

The numbers used in Figure 3 reflect the fact that out of the total deer and elk populations in GMU 55 and 551, only 70% of the elk and 75% of the deer use the area north of highway 50 while the rest of the population uses the area south of Highway 50. These percentages were provided by Tom Speeze of the DOW.

2. Utilization and Trend

Studies to determine big game use on winter ranges in the Gunnison Valley have been conducted since the mid-1960's. Information presented in this section of the report will just pertain to the years 1983 to the present.

The monitoring information shows key forage plants in the upland areas to be mountain mahogany, serviceberry, aspen, oakbrush, bitterbrush, sagebrush, and rabbitbrush, while in the riparian areas they are willow, cottonwood, chokecherry, serviceberry, aspen and rose. Mahogany is consistently used in a moderate to heavy range every year, whereas use on the other species can vary from year to year and area to area.

Unfortunately, mahogany does not occur in large quantities and total density cannot be more than 10% of the total winter range. Although serviceberry densities are not as low as mahogany it is another important forage species.

Excluding the Cimarron area, the overall use on these species are:

Uplands

Mountain mahogany	45% - 55%
Serviceberry	20% - 30%
Bitterbrush	15% - 25%
Oakbrush	15% - 25%
Sagebrush and Rabbitbrush	5% - 15%
Grasses	0% - 4%

Riparian

Aspen	35% - 45%
Cottonwood	35% - 45%
Willow	30% - 40%
Serviceberry	20% - 30%
Rose	5% - 10%

Some of these figures can vary from area to area and even within subunits. For specific utilization within riparian and upland areas, see Tables 3 and 4.

Table 3 Percentage of Use on Key Forage Plants in Riparian

	1984[1]						1985						1986					
	willow	aspen	cotton wood	service berry	rose	grass	willow	aspen	cotton wood	service berry	rose	grass	willow	aspen	cotton wood	service berry	rose	grass
Red Cr.	8						10	30	10	-	10	0						
E. Elk Cr.	89	55	80		1		23	50	30	30	-	0						
N. Willow Cr.	79	-	60	-	-	0	20	-	-	10	10	0	10	10	-	13	10	2
W. Antelope													25	30	-	-	5	2
Cabin Cr.	73	-	-	58	-	3	37	60	-	37	10	0	55	32	50	50	10	8
Alder Cr.							30	-	-	-	10	1	9	-	-	-	5	2

[1]The stem count method was still being used at this time. the information collected is based on the number of stems eaten. Whereas in the following year the information is based on use on current years growth. the same method used for livestock utilization measurement.

TABLE 4. UPLAND BROWSE UTILIZATION

	PERCENT UTILIZATION OF PLANT SPECIES																							
	December 15-May 1 1983-1984								December 15-May 1 1984-1985								December 15-May 1 1985-1986							
	B.S.	Blk.S	B.B.	S.B.	M.M.	O.B.	R.B.	G.	B.S.	Blk.S	B.B.	S.B.	M.M.	O.B.	R.B.	G.	B.S.	Blk.S	B.B	S.B.	M.M.	O.B.	R.B.	G.
SUBUNIT	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
1	-	-	-	-	-	-	-	-	10	-	10	30	50	20	-	7	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	10	30	10	35	50	20	30	5	-	-	-	-	-	-	-	-
3	29	9	45	70	90	-	-	4	11	10	10	34	50	-	17	1	10	5	15	18	33	10	7	3
4	42	14	-	60	-	-	-	20	10	10	11	20	35	-	10	0	9	11	16	19	10	-	7	6
5	-	-	-	-	-	-	-	-	10	10	10	10	10	-	-	0	6	4	12	10	8	-	8	1
6	9	Over	All	Use	Low	-	-	0	10	10	22	20	-	-	10	0	11	11	26	13	-	-	6	1
7	30	41	80	60	-	-	50	4	11	10	14	18	-	-	10	8	12	12	24	13	-	-	10	3
8	22	10	-	60	80	-	-	0	10	10	18	18	-	-	18	0	11	13	16	10	23	-	6	2
9	-	-	-	-	-	-	-	-	10	10	15	10	10	-	-	0	8	-	20	16	0	0	6	4
10	-	-	-	-	-	-	-	-	10	10	18	30	-	-	-	0	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	10	10	30	37	-	-	-	-	-	-	-	-	-	-	-	-

KEY

B.S. Big Sage
BLK. S Black Sage
B.B. Bitter Brush
S.B. Service Berry
M.M. Mountain Mahogany
O.B. Oak Brush
R.B. Rabbit Brush
G. Grass

In the Cimarron area (GUM 64), which includes those public lands northeast of town, there is a severe overuse problem, primarily on mahogany. Over the past years, use of mahogany by game animals has been heavy to severe. Use on sagebrush exceeds 30% in most years and apparent trend of key forage species is declining with poor vigor.

As stated earlier, attempts were made to monitor utilization on grasses, since this appears to be a major conflict with local permittees. After close observation over the past years, information shows that elk do not make enough use of spring green-up on public lands to influence their availability to livestock or plant vigor. In many locations use on grasses varies from 0 to only a few percentage points. Even during the severe winter of '83-'84 similar use patterns occurred throughout most of the resource area. The only noticeable use (19% on the average) observed during '83-'84 occurred on the ridge between north Beaver Creek and Steers Gulch. However, the Division of Wildlife was feeding over 1,000 head of elk at this location which accounted for this. Whereas, this did not happen in the other locations of the resource area .

Even in many of the areas where sagebrush communities were burned to improve livestock forage, not much use was observed. For example, in the McIntosh area where 300 to 400 elk winter, use on grasses in the spring were 0 to just a few percentage points.

Spring of 1985, Forest Service personnel reported elk were feeding on a burn in the upper end of Sheeps Gulch. The Sheeps Gulch burn was a 500 acre BLM burn conducted during the fall of 1984 for the purpose of improving livestock forage. Prior to this time, utilization studies in this area showed no use on the grasses over the past couple of years. As a result of the Forest Service report intensive monitoring studies were conducted two days later. After closer investigation, it was discovered that elk were utilizing approximately 20% of the new growth on grasses. Since this was a 500 acre burn, further investigation was conducted to determine just how much of the burn was receiving this amount of use. By the end of the survey it was determined that approximately 50 to 75 acres out of 500 acres were receiving 20% use. It appeared that elk were utilizing the burned area nearest the forest close to aspen cover, and use on the grasses farther away dropped to 0.

3. Distribution/Season of Use

Located in Appendix 1 are maps showing elk movements on and off winter ranges from 1983 through 1986 from December through May. Circles on the map represent locations and numbers of elk seen at that spot during the flight. The legend shows total animals observed for the unit and the date. Note the dramatic changes from one date to another, i.e. 12/29/83 to 2/5/84 for GMU-54 or 1/24/85 to 2/26/85 for GMU-55.

The first flight was made December 11, 1983. This date was chosen because of early, heavy snows and it appeared to be a hard winter. Even at this time there was talk about the need to feed elk and deer. There were a total of six flights made throughout the winter and each map shows the distribution of the elk for every flight. Maps A1-6 represent the areas west of Gunnison and maps B1-6 represent the areas east of Gunnison.

Winter - 1983-1984. Maps A1-6, B1-6.

By December 11, (Map A1) approximately 824 elk were on the winter ranges. The aerial flights showed that animals were well distributed in groups ranging from 3 to 120 throughout the area from McIntosh Mountain to Red Creek. Again, this number does not represent every animal in this location. Our attempt was to record major concentrations knowing some animals would be missed. However, at the time of the flight, I feel our counts were accurate and only a small percentage of the animals were overlooked.

As Map A1 shows, animal use was concentrated about mid-elevations, and by drawing a line from McIntosh Mountain to Red Creek through the center of the survey counts this distribution pattern can be seen. Because of heavy snows late in December, the elk feeding program began December 27th. On December 29th (Map A2) another flight was made to survey the effects on distribution of higher snowfall and the feeding program. Increased snowfall had forced many animals to the lowest elevation on the winter ranges closely paralleling Highway 50.

By February 5, (Map A5) the feeding program was in full swing and a large majority of animals had been manipulated to feeding stations in the Tenderfoot Hill, Steubens Creeks and Beaver Creek areas. By March 5 (Map A4), as weather and snow conditions started to improve some animals were starting to move off the feeding grounds.

By April 15, (Map A5) there was a definite movement of animals upslope and away from lower elevations. A line drawn from McIntosh around to Red Creek shows this shift in elevation. Since the feeding program had just about ended, many animals were seeking natural forage. By May 9th, (Map A6) most of the south facing slopes at higher elevations were free of snow and the majority of animals were gone with the exception of a few around the Forest Service and BLM boundary.

Similar patterns were observed on December 29 (Maps B1-5) from Gunnison to Quartz Creek. From December 11 to December 29, the number of animals observed increased from 324 to 570. Feeding grounds had been established by December 27th encouraging animals to concentrate in selected areas. The Division was attempting to feed at higher elevations to reduce conflicts between haystacks and elk.

By March 5, (Map B4) 612 animals were on public lands, with over 300 still on the Forest. On April 16, (Map B5) the number on public lands had dropped to 291 with approximately 122 on the forest. Looking at Map B4 notice a pattern of wanting to move upslope. On May 9 (Map B6) most of the remaining animals were observed along the BLM/Forest Service boundary. Snows tended to recede more slowly on the Forest in this area as compared to the area west of Gunnison.

Winter - 1984-1985. Maps C1-6 and D1-6.

Our first flight was made on December 27 (Map C1) and based on observed climate conditions, this winter would be considered an average winter. There was no early, heavy snowfall and for the remainder of the winter snowfall conditions appeared normal. In areas west of Gunnison, movement was similar to that of the previous year. However when a line is drawn from McIntosh to Red Creek, it is relatively higher in elevation. In '83 at this time, the line was slightly lower. Since weather conditions didn't change much between December 27 and the third week of January, the next flight wasn't made until January 24, (Map C2). Snow conditions only slightly influenced movement downward. There was some movement down around Red Creek and East Elk Creek areas, while animals around McIntosh remained high.

On February 26, (Map C3) snow conditions changed forcing a continuation of a downward movement. Furthermore, animals in the McIntosh area had not only made a downward shift, but also a westerly shift, and moved completely out of this area. Also at this time, snowmobiling activity had increased around McIntosh due to better snow conditions. West Antelope Creek subdivision appears to be the take off point for most of the snowmobile activity for McIntosh. This may have had some influence on why animals moved out of this area. This is the second year in a row this similar pattern has been observed during the aerial flights.

On March 20, (Map C4), the number of animals on the winter range were actually less than those seen in December. Snow lines were receding; south slopes on forest lands were becoming open and it appeared that many animals were already attempting to move back to the Forest. Again in April, a similar situation was occurring. There were only a few animals on the winter range and most of them were located along the Forest Service/BLM boundary. As of the 31st of April (Map C6) most of them were gone with only 97 around the east and west fork of Dry Gulch. There was nothing in the McIntosh or Stevens Creek area. For all practical purposes, most were back on the Forest by this time.

On the eastern side of Gunnison, similar movement patterns were observed. In the first part of December (Map D1) only 5 head of elk were recorded down on BLM. There were many snow free areas on the Forest and most of the animals remained there. On January 24, (Map D2) with a change in weather, over 300 elk were observed in Cabin Creek/Dry Gulch and Big Gulch areas. Still numbers were lower than last year and most stayed at higher elevations.

In February (Map D3) there was a slight warming trend resulting in fewer numbers on BLM then in January. On March 20, (Map D4) only 40 elk were observed and many southerly slopes were open on the forest.

By April 10, (Map D5) additional snow fell in the higher elevations of this area resulting in a slight increase of elk along Cabin Creek. By the 31st of April (Map D6) there were no elk observed on the winter ranges. All the snow on BLM was gone and southern slopes on the Forest were open for several miles. Most had moved onto the Forest.

Winter - 1985-1986, Maps E1-5 and F1-5.

This winter was slightly lighter than '84-'85. Maps E1-5 and F1-5 show the movement patterns. Starting west of Gunnison, the first flight was made on December 19 (Map E1), and a similar movement pattern was observed. There were 575 elk on the range at this time with most of them concentrating at higher elevations. The January 28 (Map E2) flight shows similar movement patterns. Animals in the McIntosh area are completely gone and more than likely have moved west. Snowmobiling activity had increased in the area by this time. By March 3 (Map E3) only 288 elk were observed. Snows were light and many areas on the Forest Service were still open. Many of the south slopes did not completely close thus allowing the animals to remain on the Forest through most of the winter.

On March 27 (Map E4), there were only 186 animals on public land, mostly in the Tenderfoot/Red Creek area; animals in the McIntosh/Steubens Creek/Stevens Creek were gone. By the 15th of April (Map E5) there was nothing observed on the winter range below the Forest.

Similar patterns were observed east of Gunnison. On December 19 (Map F1) there were 227 elk on BLM and 70 on the Forest, with most of them concentrated in the Cabin Creek/Dry Gulch area. Those on the Forest were in Alder Creek/Big Gulch areas. The following month (Map F2) there were actually fewer animals on the winter ranges with approximately 163 on BLM and 95 on the Forest. Most of those in the Alder Creek/Big Gulch area had

moved to higher elevation. Again, a similar pattern followed the next month as the year before. In April (Map F4) there were 130 animals and all were using areas along the Forest Service/BLM boundary. By this time, most had moved back onto the Forest. By April 15 (Map F5) very few animals were on the winter ranges; 4 on BLM and 150 on the Forest. Everything was open and most were able to occupy areas at higher elevations.

Winter conditions greatly influence the number of animals using BLM winter ranges. During winters similar to '83-'84, the majority of animals in the population for game management unit 54 winter below the National Forest. In GMU 55, east of Gunnison, 500 to 600 elk do. Average winters similar to those of '84-'85 and '85-'86, (which is the norm nine out ten years) elk numbers wintering within the Resource Area would be much lower and remain fairly constant. Table 5 shows the results of the aerial flights.

Table 5 BLM Aerial Flight Counts

	GMU 54			GMU 55		
Month	83/84	84/85	85/86	83/84	84/85	85/86
December	824	644	575	324 BLM 20 FS	5	227 BLM 70 FS
December	1159	-	-	570	-	-
January	-	637	111	-	331 BLM 70 FS	163 BLM 95 FS
February	1992	405	-	390 BLM	159	-
March	1987	410	288 BLM 3 FS	612 BLM 305 FS	40	288 BLM 101 FS
March	-	-	186 BLM 85 FS	-	-	131 BLM 61 FS
April	942	404	0	291 BLM 122 FS	302 BLM 40 FS	0 BLM 150 FS
April	-	97 BLM 37 FS	-	-	0	-
May	251 BLM 40 FS	-	-	329 BLM 240 FS	0	0

Several popular snowmobile areas were identified during the flights. Areas around McIntosh mountain between West Antelope Creek to the upper end of Steer Gulch appears to be a popular area. This location is used consistently and fairly heavily. It appears that individuals from Gunnison use West Antelope Creek subdivision as a take off point. There is road access to this location and it puts them in good snow conditions immediately.

During the winter of 1983-84, snowmobile activity was starting to take place around Gunnison by the last week of December. The McIntosh area already had signs of use. Throughout the winter, use continued to increase and expand further in to the winter range on a monthly basis. During winters of 1984-85 and 1985-86, snowmobile activity started about the middle of January and because of snow conditions, almost all activity was limited to McIntosh and north to West Antelope Creek.

Other popular locations include Rainbow Lakes Road, where the majority of individuals appear to use the road to the BLM/Forest Service boundary. From here, the area open up into large flats more suitable for snowmobiling. They also use ridgetops in this area. Other areas are Red Creek and, to a lesser degree, East Elk Creek.

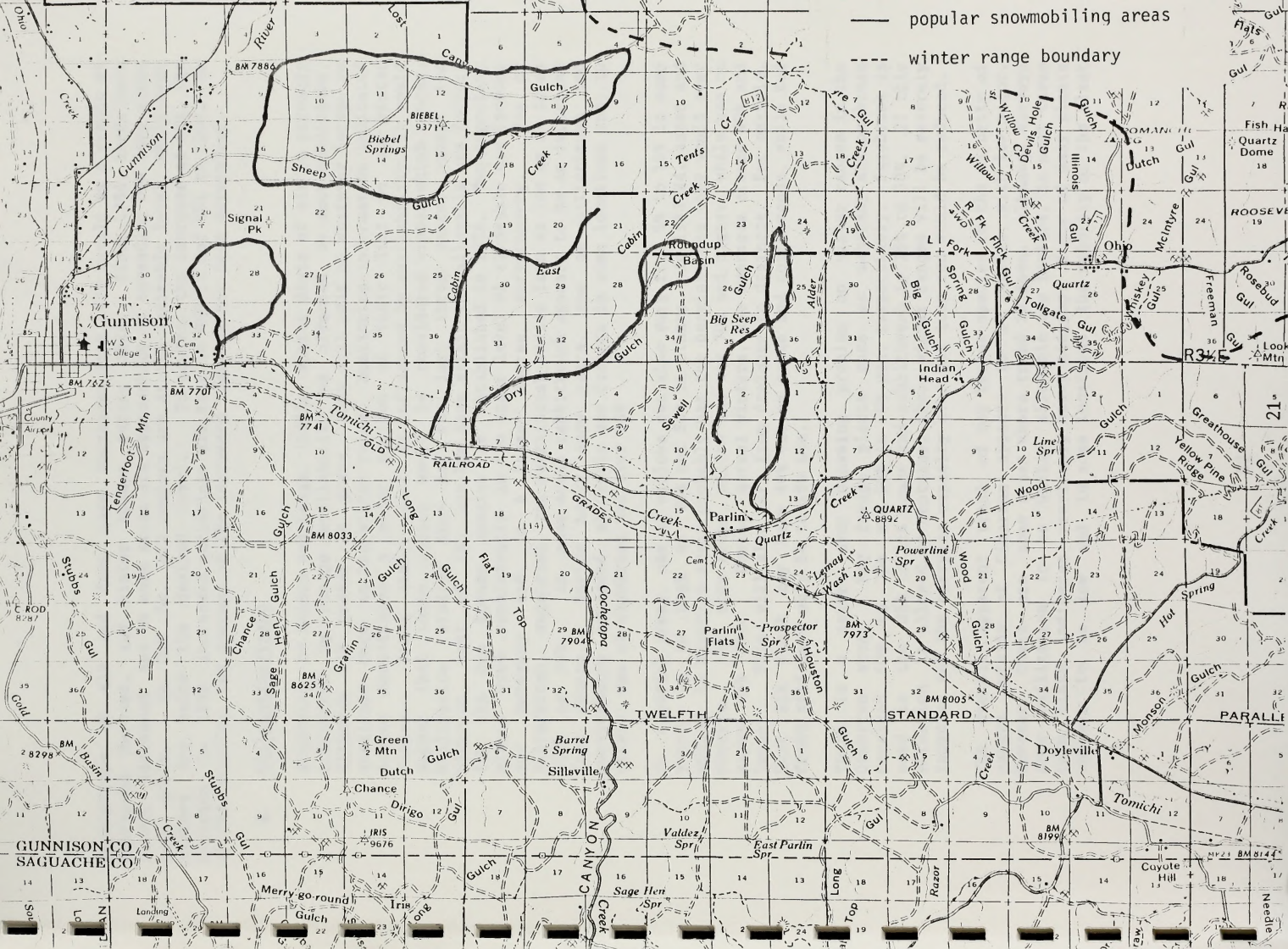
On winter ranges east of Gunnison, most people tend to use Lost Canyon Road as the primary access route. Snowmobile activity takes place in Sheeps Gulch, a small drainage just to the south of the road behind Signal Peak, while others use areas from the Forest Service boundary west to County Road 10. Another popular spot is the upper end of Lost Canyon to the Cabin Creek headwaters. Other locations include the area behind Tomichi Heights, Dry Gulch and North Parlin Flats. See Figure 4A & 4B.

IV. CONCLUSION

A. Actual Use

The method used to collect actual use information from the Division is working out very well. The numbers they are providing are as accurate as can be expected when dealing with wild populations. As stated earlier, the number of animals wintering within the Resource Area can fluctuate from year to year depending on weather conditions. This fluctuation should not be interpreted as a decrease or increase in population. During severe winters the majority of the population in GMU 54 will winter below the Forest. Approximately 500 to 600 elk winter in GMU 55, east of town. During normal winters, this number changes dramatically, i.e. in areas west, approximately 1,000 elk winter, while on the east, the numbers drop to only 300 to 400.

popular snowmobiling areas
winter range boundary
Harris Park
Gunnison
McIntosh Mtn.
Hartman Gul
Blimberry Gul
Gunnison Ck
Gunnison River
Gunnison County Airport
Ski Tow
Gravel Pit
BEAVER CREEK C.G.
HENRY
BM 8036
BM 7795
BM 7675
BM 8206
BM 8291
BM 8247
BM 7987
BM 8298
BM 8742
BM 8744
BM 8926
BM 9466
BM 9523
BM 9286
BM 9572
BM 9052
BM 8475
BM 8883
BM 8287
RUNAWAY
SUN
C ROD
CEBOLLA
BIG MESA
Blaine Rock
Big Springs
Tenmile Sprs
WILDCAT
Lily Belle Mine (Inactive)
Rock Spr
Poison Spr
Coal Ck
Elk Park
Lion Gul
Red Creek
Bull Bear Gul
East Fork Dry Creek
West Fork Dry Creek
Tenderfoot Hill
Dillon Gul
Bear Gulch
Deadman Gul
Main Gul
Steuben Gul
Tommy Long Gul
Reed Gul
Sun Jack Gul
Steens Gulch
Antelone Creek
Beaver Creek
Willow Creek
Stubbs Creek
Gold Basin
South Beaver Creek
Long Gulch
Sugar Pole Creek
Wolf Creek
Cebolla Creek
Lake Gulch
Carpenter Gulch
Fourmile Gul
Sapinero Gul
Mesa Ridge
Dry Mesa
East Mesa
West Mesa
Fan Gul
Kezar Basin
Tomichi Creek
CURECANTI RECREATION AREA
(INDEFINITE BOUNDARY)
Rec Area Headquarters
ELK CREEK C.G.
MESA RESERVOIR
TWELFTH STANDARD PARALLEL NORTH
R 2 W
R 1 W
R 1 E
T. 5
T. 4
20
PRINCIPAL MERIDIAN
NEW MEXICO
GUNNISON CO
SAGAUCHE CO


popular snowmobiling areas
winter range boundary
Gunnison
Biebel Springs
Signal Pk
Roundup Basin
Big Seep Res
Indian Head
Tollgate
Parlin
Parlin Flats
Prospector Spr
Powerline Spr
Line Spr
Barrel Spring
Sillsville
Doyleville
Green Mtn
Chance
Dutch
Merry-go-round
Iris
Valdez Spr
East Parlin Spr
Sage Hen Spr
Coyote Hill
Quartz Dome
Fish Ha
Tomichi
OLD RAILROAD GRADE
TWELFTH STANDARD PARALLE
CANYON
GUNNISON CO
SAGUACHE CO
County Airport
Cemetery
BM 7886
BM 7701
BM 7741
BM 8033
BM 8625
BM 7904
BM 7973
BM 8005
BM 8199
BM 8144
BM 8298
BIEBEL 9371
QUARTZ 8892
IRIS 9676
R34E
R35E
21

Populations of elk and deer have decreased from 1978 levels as a result of increased harvest, and winter losses during 1984. Since 1984, herds have slowly increased and in some areas are approaching or exceeding DOW long range herd goals. In GMU 54, elk numbers are at the desirable level, while deer numbers are below the desired level. To control the increase of elk, the Division in 1988 increased antlerless elk tags in GMU 55 and 551 to 1200. As of this writing, the success of the increased tags has not been determined.

B. Utilization/Trend

According to Nelson and Leege, (1982), winter diets of elk is strongly influenced by forage availability as affected by snow conditions. Although elk prefer to graze, they will exit on whatever forage is available once on the winter range. Monitoring information indicated browse constitutes a major portion of their diet on our winter ranges. Since winter diet is influenced by availability, it would appear that these ranges would be considered winter shrub ranges. Utilization studies show for the last three years, except for Cimarron, most of the use has been within the allowable use factors for the key forage species as established in 1978. Two important plants used consistently in the upper level of allowable use factors are mahogany and, to a lesser degree, serviceberry. Use of bitterbrush, sagebrush and rabbitbrush varies from as low as 5% to as high as 20%. In some areas rabbitbrush appears to be an important food source. During heavy snow years, use on bitterbrush and serviceberry exceeded allowable use factors in some locations and, in others, use of sagebrush was over 20%

In riparian areas, use of willows can also vary from 5% to 10% in some years, to as high as 40% and 50% in others. In 1983-84, aspen and willow in riparian areas probably had the heaviest use they would ever receive. In some areas, willow use was 70% and higher, while use on aspen was 80%. During normal winters, use averages around 40% and lower. This will also vary from drainage to drainage. For example, East Elk Creek may have 40% use on aspen and cottonwoods, while Red Creek will have only 5% to 15% use.

There is a severe over browsing problem on winter ranges in the Cimarron area. Key forage plants such as mahogany and oakbrush received 60% to 70% and 50% to 60% use, respectively. Sagebrush is used in the 25% to 35% range and rabbitbrush is 15% to 30%. If this situation is allowed to continue, these winter ranges will be severely impacted and the carrying capacity over the long run would be reduced.

The overall apparent trend of key browse species on the majority of ranges outside of Cimarron appears to be static with low vigor. However, there are some areas where trend is down. Although surveys show utilization to be within allowable use factors, in most cases form class indicates previously heavy hedging. Vigor of many plants appears to be low and in some locations, the majority of the plant

communities are even aged with little or no reproduction. This situation exists more on winter ranges west of Gunnison than those east. Two key plants of concern are mountain mahogany and serviceberry, since they are consistently used in the higher percent ranges. This heavily hedged appearance must be the result of several hard winters similar to that of 1983-84 since the use recorded during normal winters should not result in this kind of appearance. It takes several years for these plants to recover and reach their full forage potential.

Although all would agree that grass is the most important forage for elk during spring green up, our surveys show use on grasses to be low compared to other forage used. In most locations in the Resource Area, use on grasses was 0% to 5% and very difficult to detect. Even during the 1983-84 winter, use on grasses was slight. Photos in Appendix 2 were taken in some of the heavier use areas during winter. Comparing use on sagebrush, which appears to be fairly heavy, grass plants are in boot and don't show any indication of use. These pictures represent grass conditions throughout most of the winter range during April and May and do not attempt to show just a small area. Similar situations exist in riparian areas.

Photos in Appendix 3 show comparisons of utilization levels between elk and cattle on grasses in riparian areas. Cage 2 shows the effect of elk grazing while cage 1 represents an area of no grazing. The area outside both cages shows cattle grazing. There is very little difference between growth in both cages, while the outside shows severe use. Our information shows that cattle grazing levels in riparian areas is severe, ranging from 80% to 90%, while elk grazing was 0% to slight. Utilization cages are also established in the uplands and similar comparisons are also made in these areas. See Table 4.

This 0% to slight use on grasses by elk could be contributed to the fact that most of them have left the lower elevations and are on National Forest lands. This is also supported by the aerial flights. During normal winters the majority of elk are gone by mid April, when grasses are beginning to grow. Even in 1983-84, by the first of May when snow conditions were still severe on the Forest, elk concentrated along the BLM/Forest boundary. These animals follow the melting snowline back to the Forest and do not migrate down to lower elevations at night to take advantage of green up.

However, Forest Service or BLM could alter this by changing or altering management practices. For example, recent sagebrush treatment projects have already influenced use patterns in the Lost Canyon and Sheeps Gulch areas. These two locations were burned for sagebrush control and resulted in encouraging elk to remain on these lower areas. In the past, these animals would more than likely have gone to higher elevations.

Another factor that could enter into this low use on grasses by elk and deer is that grass production far exceeds spring needs for existing numbers. Therefore, I feel that grazing by elk and deer on these ranges did not result in their poor to fair range conditions or lack of key forage plants in the understory as identified during the grazing EIS. If these ranges remain in poor to fair condition, it is not as a result of elk and deer use.

Physical damage of riparian areas has been another area of conflict. Observations show they are important areas for elk and deer and are used extensively throughout the winter months. This is a time when riparian areas are covered by several feet of snow and frozen. This provides protection to grasses and to streambanks making it difficult to physically impact riparian areas. On the other hand, cattle use riparian areas in early May, a sensitive time of year, when soils are saturated and at the beginning of the growing season for grasses. This encourages cattle to remain on riparian areas until utilization reaches a point that they are forced to move to the uplands for additional forage. This results in severe overgrazing, streambank damage, erosion, and increases the invasion of undesirable plant species.

C. Distribution/Trend

Snow conditions not only play an important factor in determining numbers that winter in the Resource Area, but also what elevations they use. During years of heavy snows, animals move to elevations below 8,000 feet. During normal winters, the majority of elk remain at 8,500 feet and above, while deer occupy areas below 8,500.

The relative importance in terms of location of wintering areas has also been questioned, especially in relation to shrub removal treatment proposed by other BLM programs. The entire area, starting from Antelope Creek west to Dillon Pinnacles is critical range. There may be small areas within this location that could be treated without impacting animals, but proposals would have to be evaluated on a site by site basis. An example would be the lower end of Stevens Creek and Rainbow Lakes Road, near highway 50. If properly designed, some vegetation treatment, especially if it increases desirable shrub species, can be beneficial.

Elk concentration areas east of Gunnison include the drainages of Cabin Creek, Alder Creek and the upper end of Sheeps Gulch. Cabin Creek in particular tends to draw elk every year, whereas deer tend to concentrate in the Lost Canyon, Leeps Gulch, behind Tomichi Heights and along Highway 50 from Tomichi Heights to Quartz Creek.

Season of use extends from December to mid April. An exception to this would be during year of extreme snowfall when areas on the Forest remain covered with snow. In this case, portions of the wintering population have remained up until the final week of May along the BLM and Forest boundary.

Snowmobile activity has been documented in other states as having definite influence on elk movement patterns. By mapping elk distribution and comparing it to snowmobile activity, observations in the McIntosh area revealed a correlation between areas avoided by elk and the level of snowmobile activity. As snowmobile use increased around McIntosh, elk appeared to shift to the west and to the area along North Beaver Creek. West Antelope Creek had no indication of many elk wintering there during the height of snowmobile activity. There was a shift back into these areas in March when snowmobile activity tended to drop off. I feel the Division lost an opportunity to feed elk on the McIntosh area in 1983-84 because of snowmobile activity.

V. DISCUSSION AND RECOMMENDATION

The concern of elk competing with livestock on the ranges north of Gunnison in the Resource Area has been greatly exaggerated. This applies to both the upland and riparian areas. If there is a conflict it is between elk and deer for key forage plants like mahogany and serviceberry. There is no evidence to attribute existing degraded range conditions to present or historical use of these areas by game animals. By doing so, would only be avoiding the real problem.

Listed below are the objectives set forth in the study and their analysis:

1. Establish actual use numbers.

Actual use numbers are now being submitted on a yearly basis by the Colorado Division of Wildlife. Number submitted represents that segment of the population in a GMU using winter ranges in the Resource Area. Numbers are determined from pre- and post-hunt population estimates, sex ratio, animal distribution, and the number of animals observed during aerial surveys. After all data is collected and evaluated, the Division then calculates numbers of animals wintering in that subunit from December to May. Since these animals are not limited by boundaries and snow conditions can influence distribution patterns, these numbers can vary at any point in time. But for all practical purposes, they represent the average number of animals wintering in a subunit during that particular winter. After evaluating the numbers submitted by the Division and comparing then to aerial flight information, they appear to be accurate and give a good picture of what is going on throughout most of the Resource Area. The only wintering herd numbers in question would be in the Cimarron area since numbers submitted appear to be low when compared to the high utilization going on there now. It is hard to understand how approximately 120 head of deer and elk can severely over use such a large area. This area is also a sheep winter allotment but has been used only in the spring since 1982, yet the high winter use has continued.

Recommendations:

1) Request the Division to make an extra effort to conduct additional aerial surveys in the Cimarron area during winter months.

2) The Bureau should monitor the sheep use in this allotment more intensively to determine if a trespass is occurring.

3) The Bureau and the DOW should conduct banding studies to monitor movement patterns of animals.

4) Continue to collect actual use numbers for the Resource Area on a yearly basis.

5) If elk and deer numbers exceed long range population goals, request the DOW to reduce the numbers accordingly.

2. Determine elk use on spring grasses prior to May 15th.

Monitoring surveys show that elk use of grasses on spring ranges in the Resource Area north of Gunnison is minor. Throughout the majority of the area use is 0% to 5%. There is no reason to expect utilization levels to change to any degree if elk populations remain at 3000 in GMU 54, and 2100 in GMU 55 and portions of GMU 551, and distribution is not altered. This low use level can probably be attributed to several factors. For the most part, the majority of the elk have left the lower elevations for the forest by April 15, and/or production of spring grasses far exceeds the needs of existing populations of elk and deer. Most likely it is a combination of both. Therefore, slight herd increases in the future should not affect the utilization level on grasses unless the BLM or Forest Service does something to alter movement patterns. Furthermore, if existing range conditions do not improve, utilization of the understory plant community by elk and deer is not the primary factor.

Recommendations:

1) Continue to monitor utilization on burns located in a close proximity to BLM and Forest Service boundary.

2) Conduct monitoring surveys on grass communities on critical wintering areas south of Gunnison.

3. Determine use by big game on key browse species.

The five most important browse plants in the Resource Area are mountain mahogany, serviceberry, cottonwood, willow and aspen. Although sagebrush is not a key forage during normal winters it is the primary plant that will carry elk and deer through a severe winter because of its abundance and availability in deep snow. Mountain mahogany and serviceberry are in low density and because of this, utilization in some areas are already at maximum. Even though these communities are static, existing use levels have influenced the health and vigor of these plant communities. In the Cimarron area the majority of these species appear to be on the way out because use levels exceed 60% on a yearly basis. These plants need to be rested or the future carrying capacity of this area will be greatly reduced.

Recommendations are:

1) Reduce by 50% the number of deer presently wintering in the Cimarron area. This could be accomplished by conducting a late season hunt, or by not artificially feeding them during severe winters, thus allowing a partial, natural die off.

2) Fire could be used to increase production of mahogany and oakbrush throughout the Resource Area.

3) Manage the existing elk herds in GMU 54 at 2800 and not increase deer past the present population (3500) unless elk numbers are reduced to help improve the vigor and production ofthe browse stands in the area.

4) Maintain elk herds at 2100 in GMU 55 and 551 north of Hwy 50 and deer herds at the 1987 level of 3500. This is 1500 deer less that the Division has proposed for the GMU. Hopefully this would increase the vigor and production of critical browse stands.

5) Change from the nested frequency method of conducting trend studies to the line intercept method. The line intercept method has the ability to detect changes in the shrub communities faster than frequency.

6) Increase density of mountain mahogany and serviceberry by initiating a planting program.

7) Intensify the line intercept trend studies in GMU 54, 55, and 551 to monitor whether or not Mountain mahogany or serviceberry communities are increasing or decreasing.

4. <u>Determine utilization levels and influences of elk and deer on riparian areas.</u>

Riparian areas are a very important component of winter habitat. They provide critical forage and cover throughout most of the winter. However, may of our riparian systems are in poor condition as they relate to wildlife habitat. Many stream channels are unstable and in several locations much of the desirable native vegetation is being replaced by invader species such as roses, hawthorne, Canadian thistle, and shrubby Cinquefoil. Form class of willows in several locations has been altered to the point that their vigor and production are below potential.

Through my observations while conducting use surveys, I have come to the conclusion that riparian areas are difficult to hurt when used during winter months and allowed to rest during the spring growing season. A good example of this is East Elk Creek. This

creek receives some of the highest elk and deer use of any riparian area in the resource area and receives no livestock grazing in the spring, yet this riparian system is in excellent condition.

Also the two week trailing of cattle through winter ranges in the fall are removing summer regrowth (winter cleanup) in these systems that could be available to elk. If available, this regrowth could be an important forage source. This has been observed on pastures and allotments that have been rested.

My conclusions are that utilization levels are within tolerable levels in those riparian areas north of highway 50 under existing big game population numbers. Winter grazing on willows could actually be increased without hurting them. The influence of elk and deer grazing on these systems are not hurting them under the existing season of use.

Recommendations:

1) Do not trail livestock for two weeks in the fall on those winter ranges north of highway 50. This would make any regrowth in riparian areas available to elk during the winter.

2) Burn several riparian areas to improve the vigor and production of willows and cottonwoods. These areas include Cabin Creek, Steers Gulch, North Willow Creek, Wood Gulch, Alder Creek, North Beaver Creek, and West Antelope Creek.

3) Do not incourage recreational activities in riparian areas during the winter months.

4) Continue to monitor utilization levels.

5) Reverse the invasion of undesirable plants and reduce livestock impacts to riparian areas during the spring.

5. <u>Determine elk distribution patterns on the winter range from December 15 to May 1.</u>

Elk use patterns and season of use are greatly influenced by snow conditions. During years of normal to light snowfall, elk remain at higher elevations and will distribute themselves fairly evenly throughout the winter ranges When snowfall becomes extreme, elk move to lower elevations along highway 50. In many places they will displace deer and force them into poorer locations. Severe winters would be considered those when snowfall in Gunnison exceeds 35 cm (14 inches) the first of December or exceeds 50 cm (19 inches) the first of January.

Elk will follow the receding snow line back to the forest in spring and, in most cases they are gone from the resource area by mid-April.

Recommendations:

1) Determine distribution patterns on winter ranges south of Gunnison.

2) Monitor distribution in and around all treatment areas along forest and BLM boundaries.

6. Determine key use areas within the winter ranges.

Virtually the entire area north of Gunnison is a key big game use area. Elk occupy mid to upper slopes while deer occupy mid to lower slopes. During the surveys, no individual area could be separated as being more critical than another. It has been assumed by many agency individuals that south and southwest slopes are more important than east and northeast slopes which have been overlooked. During the aerial surveys it was observed that north and northeast slopes were the first place animals used in the fall and the last place they went in the spring. During the middle of winter, most of these areas became covered with snow, making them unusable and forcing animals to move to another location. After close investigation, it was found that north and northeast slopes contain the majority of mountain shrub type plants with an excellent understory. These areas contain taller and more palatable shrubs than drier south slopes. Although not proved, these areas could be refueling locations where animals obtain sufficient fat reserves to see them through the harder winter months when they have to occupy south slopes and subsist on less palatable shrubs. Therefore, I feel that these areas are just as significant as south and southwest slopes.

Treatments on north and northeast slopes must be looked at on a case by case basis and scrutinized very closely to ensure that we are not removing important refueling areas. Lower elevations probably do not have enough high quality shrubs to support a good healthy deer herd. Treatments of these locations without any attempt to increase important shrubs would further jeopardize carrying capacity.

Recommendations:

1) Map locations within the critical area that could be treated to improve livestock forage without jeopardizing forage for big game.

2) Limit all treatment to these areas.

3) Determine the key use area south of Gunnison.

7) <u>Determine snowmobile activity influence on elk distribution patterns.</u>

Several agencies in many states have closed critical winter ranges to snowmobiling and/or all human activity to reduce human disturbance to wintering animals. From 1980 to 1983, similar restrictions were in effect on winter ranges in the Resource Area. But in 1984 public pressure resulted in the lifting of these restrictions and now all areas are open to snowmobiling. However, winter ranges north of Gunnison can still be closed depending on snow conditions and will be evaluated on a year to year basis.

During the aerial flights, there appeared to be a relationship between areas occupied by elk and snowmobile activity. McIntosh area is a good example. Early in the year, 300 to 400 elk occupied the east and south slopes of McIntosh Mountain. this is also an important snowmobiling area. As snow depth increased, snowmobiling activity around McIntosh increased and eventually elk moved off. Similar patterns are also seen east of Gunnison, but not as dramatically. However, in most cases where there are signs of heavy snowmobile use, there is a lack of wintering animals.

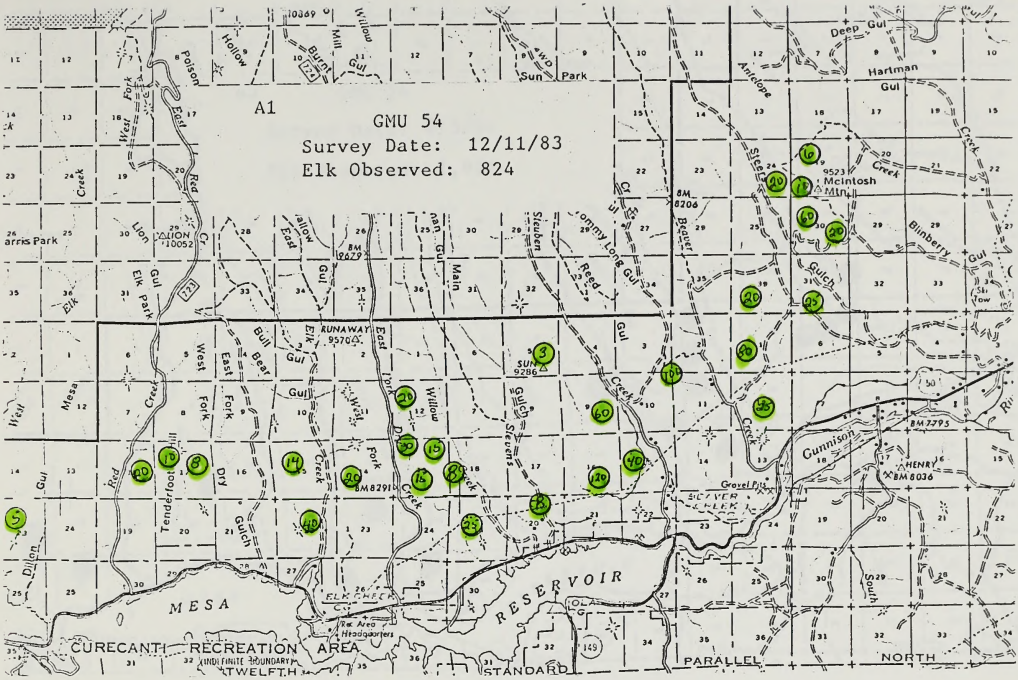
Recommendation:

1) Close the winter ranges where snow depth exceed 30 cm in Gunnison by the first of December or 50 cm by the middle of January.

APPENDIX 1

Elk Distribution Patterns

1983 – 1986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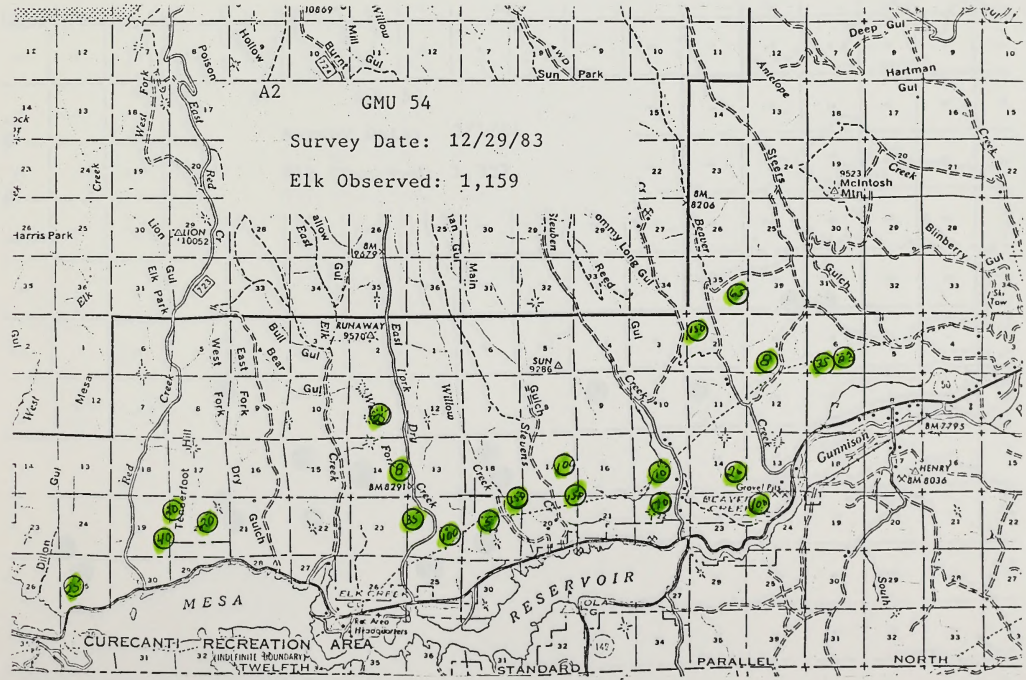
GMU 54
Survey Date: 12/11/83
Elk Observed: 824
MESA
CURECANTI RECREATION AREA
RESERVOIR
STANDARD
PARALLEL
NORTH
Gunnison
Sun Park
Harris Park
McIntosh Mtn
Hartman Gul
Deep Gul
Antelope
Blinberry
Runaway
Tenderfoot
Elk Park
Red Creek
Dry Gulch
Willow
Beaver Creek
Gravel Pit
Elk Creek Rec Area Headquarters
Henry
Dillon
Poison Hollow
Mill Gul
Burnt Gul
Lion Gul
Sheep Gulch
Sneaks Gulch
Tommy Long Gul
Reed Gul
Main Gul
Bear Gul
Gull
West Mesa
West Fork
East Fork
Sun
Beaver
Steers
South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GMU 54
Survey Date: 12/29/83
Elk Observed: 1,159
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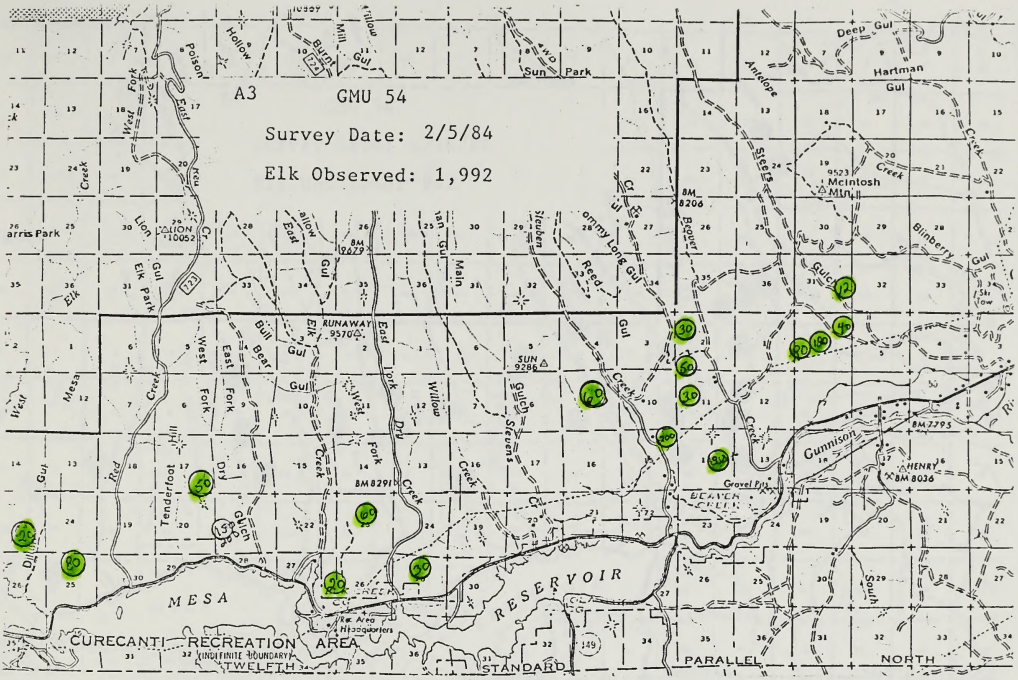
CURECANTI RECREATION AREA
RESERVOIR
STANDARD
PARALLEL
NORTH
Gunnison
Sun Park
Harris Park
McIntosh Mtn
Hartman Gul
Deep Gul
Antelope
Blinberry
Runaway
Tenderfoot
Elk Park
Red Creek
Dry Gulch
Willow
Beaver Creek
Gravel Pit
Elk Creek Rec Area Headquarters
Henry
Dillon
Poison Hollow
Mill Gul
Burnt Gul
Lion Gul
Sheep Gulch
Sneaks Gulch
Tommy Long Gul
Reed Gul
Main Gul
Bear Gul
Gull
West Mesa
West Fork
East Fork
Sun
Beaver
Steers
South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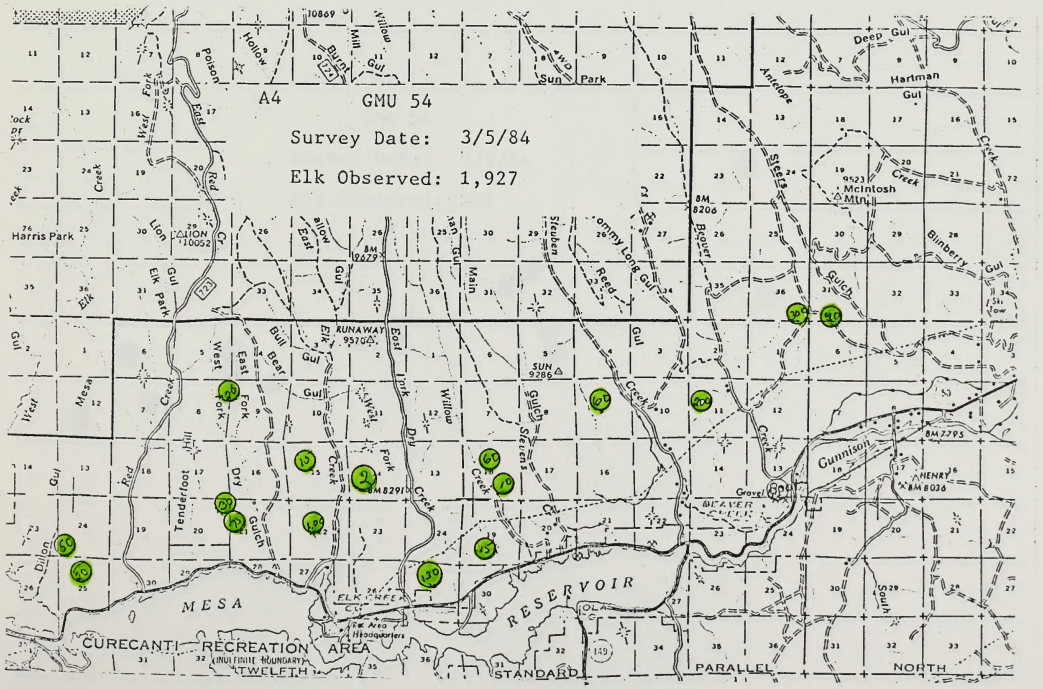
GMU 54
Survey Date: 2/5/84
Elk Observed: 1,992
Harris Park
Sun Park
Hartman
Deep Gul
Antelope
McIntosh Mtn
Blimberry
Runaway
Sun
Gunnison
Gravel Pit
Beaver Creek
Reservoir
Mesa
Curecanti Recreation Area
Ke Area Headquarters
Twelfth Standard Parallel North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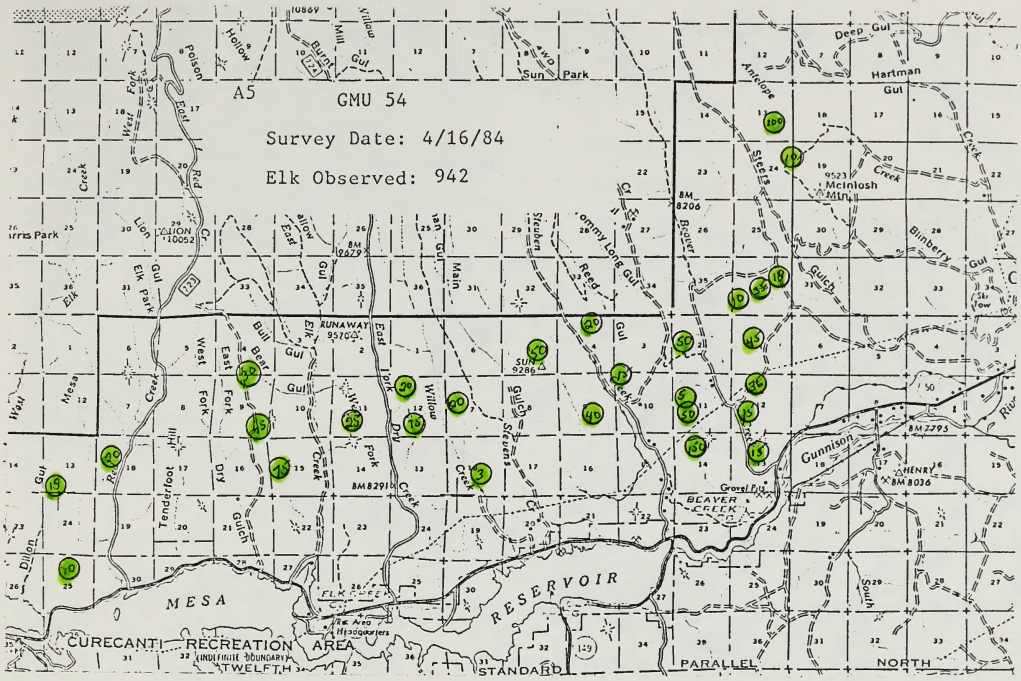
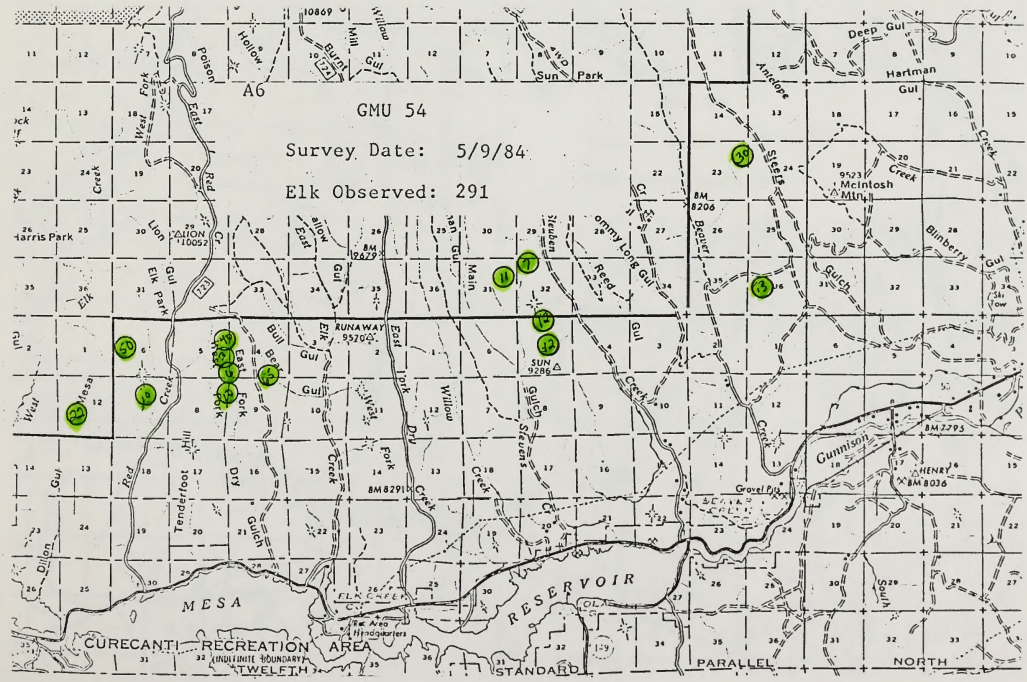
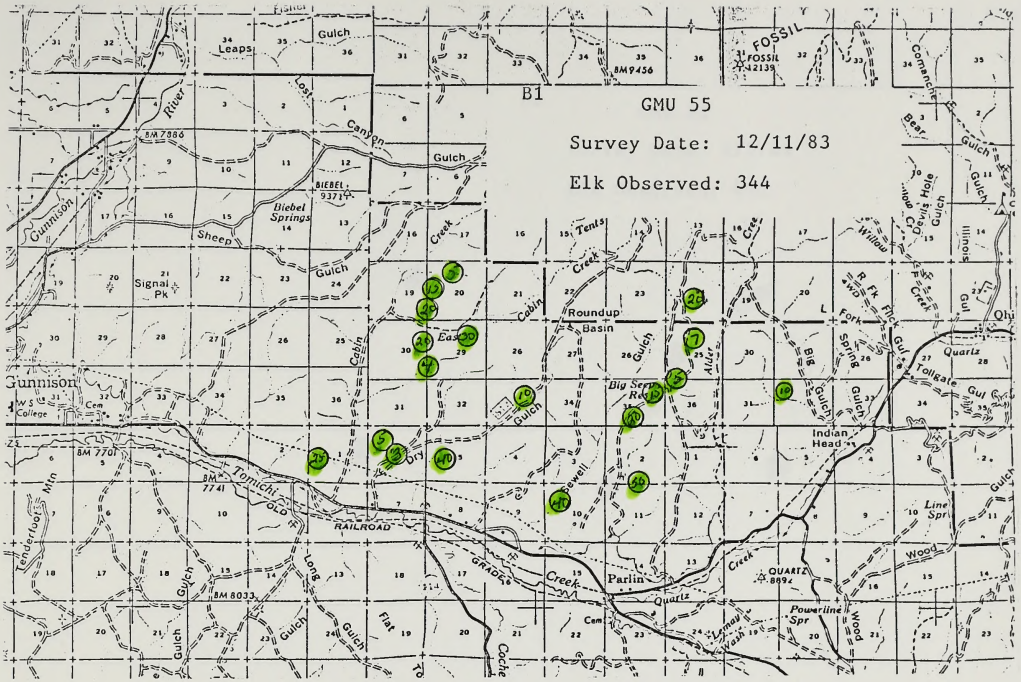
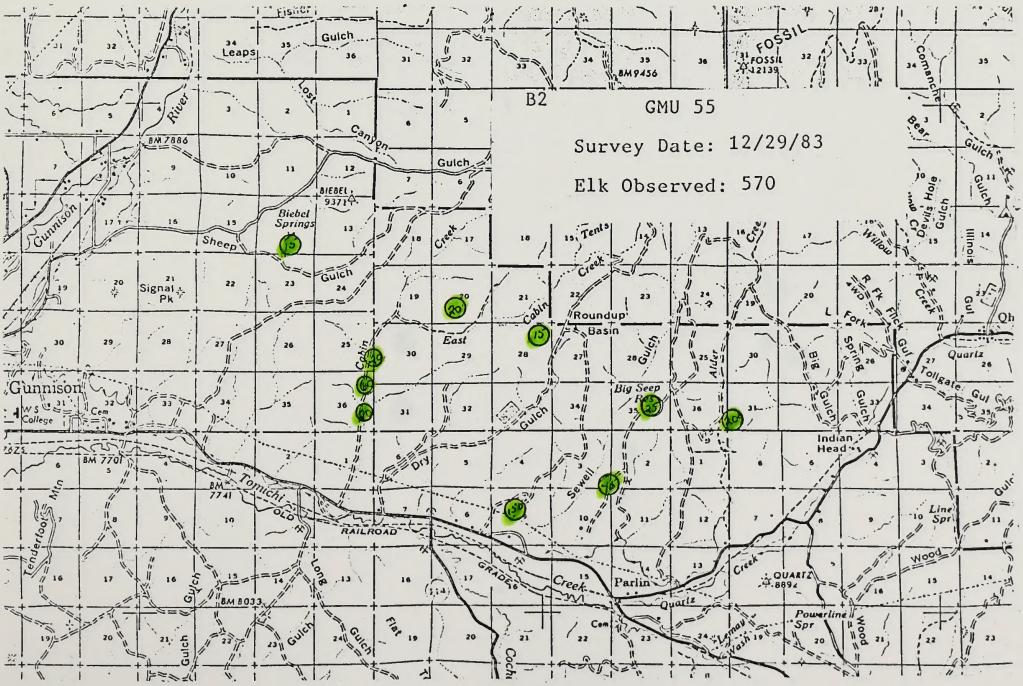
GMU 54
Survey Date: 3/5/84
Elk Observed: 1,927
Harris Park
Sun Park
Hartman
Deep Gul
Antelope
McIntosh Mtn
Blimberry
Runaway
Sun
Gunnison
Gravel Pit
Beaver Creek
Elk Creek
Reservoir
Mesa
Curecanti Recreation Area
Ke Area Headquarters
Twelfth Standard Parallel North


A5
GMU 54
Survey Date: 4/16/84
Elk Observed: 942
MESA
RESERVOIR
CURECANTI RECREATION AREA
STANDARD
PARALLEL
NORTH
Gunnison
Hartman Gul
McIntosh Mtn
Sun Park
Runaway
Beaver Creek
Elk Creek
Tenderfoot Hill
Dry Gulch
Willow Creek
Steuens Creek
Lion Gul
Elk Park
Bull Gul
Bear Gul
Blimberry Gul
Deep Gul
Antelope Creek
Steers Gul
Reed Gul
Main Gul
Dillon Gul
Poison Hollow
Mill Gul
Burns Gul
Harris Park
Gravel Pit
Elk Area Headquarters
Henry
South Ski Tow


A6
GMU 54
Survey Date: 5/9/84
Elk Observed: 291
MESA
RESERVOIR
CURECANTI RECREATION AREA
STANDARD
PARALLEL
NORTH
Gunnison
Hartman Gul
McIntosh Mtn
Sun Park
Runaway
Beaver Creek
Elk Creek
Tenderfoot Hill
Dry Gulch
Willow Creek
Steuens Creek
Lion Gul
Elk Park
Bull Gul
Bear Gul
Blimberry Gul
Deep Gul
Antelope Creek
Steers Gul
Reed Gul
Main Gul
Dillon Gul
Poison Hollow
Mill Gul
Burns Gul
Harris Park
Gravel Pit
Elk Area Headquarters
Henry
South Ski Tow


B1
GMU 55
Survey Date: 12/11/83
Elk Observed: 344
Gunnison
Signal Pk
Biebel Springs
Roundup Basin
Big Seep Rd
Indian Head
Parlin
Tomichi
Sewell
Dry
Cabin
Alder
Big
Quartz
Tollgate
Line Spr
Powerline Spr
Wood
Illinois
Willow
Tents
Creek
Gulch
Sheep
Lost
Canyon
River
Leaps
Fisher
FOSSIL
Comanche
Bear
Hole
Tenderfoot Mtn
Long
Flat
Cache
Lenado Wash
RAILROAD
GRADE
OLD
BM 7886
BM 7701
BM 7741
BM 8033
BM 9456
BIEBEL 9371
FOSSIL 12139
QUARTZ 8894
Cem
W S College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GMU 55
Survey Date: 12/29/83
Elk Observed: 570
Gunnison
Signal Pk
Biebel Springs
Roundup Basin
Big Seep Rd
Indian Head
Parlin
Tomichi
Sewell
Dry
Cabin
Alder
Big
Quartz
Tollgate
Line Spr
Powerline Spr
Wood
Illinois
Willow
Tents
Creek
Gulch
Sheep
Lost
Canyon
River
Leaps
Fisher
FOSSIL
Comanche
Bear
Hole
Tenderfoot Mtn
Long
Flat
Cache
Lenado Wash
RAILROAD
GRADE
OLD
BM 7886
BM 7701
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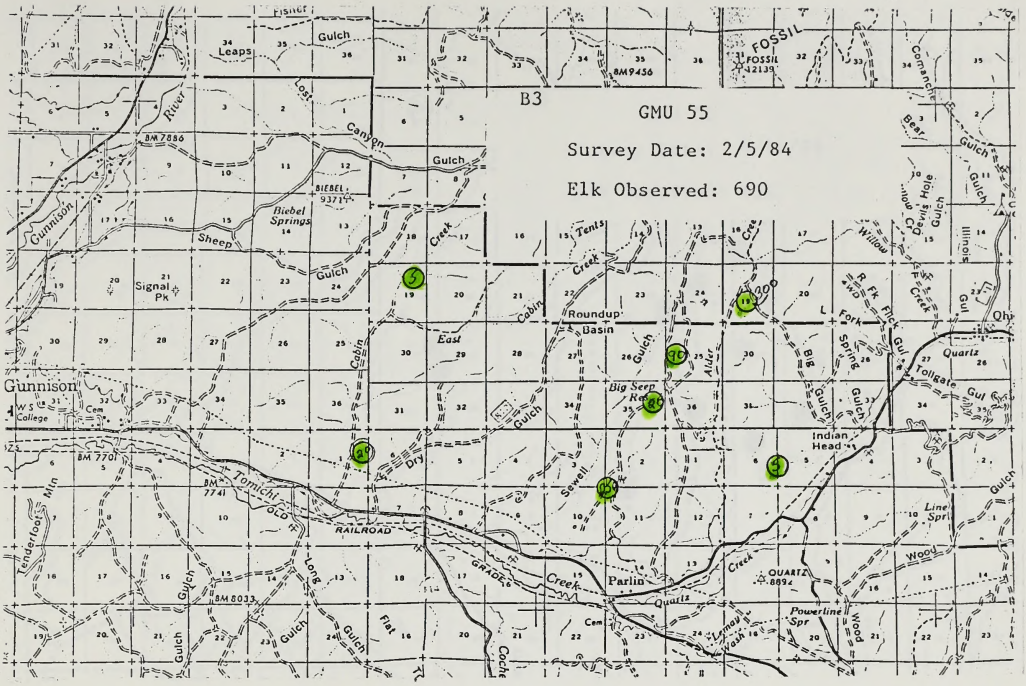
BIEBEL 9371
FOSSIL 12139
QUARTZ 8894
Cem
W S College


B3
GMU 55
Survey Date: 2/5/84
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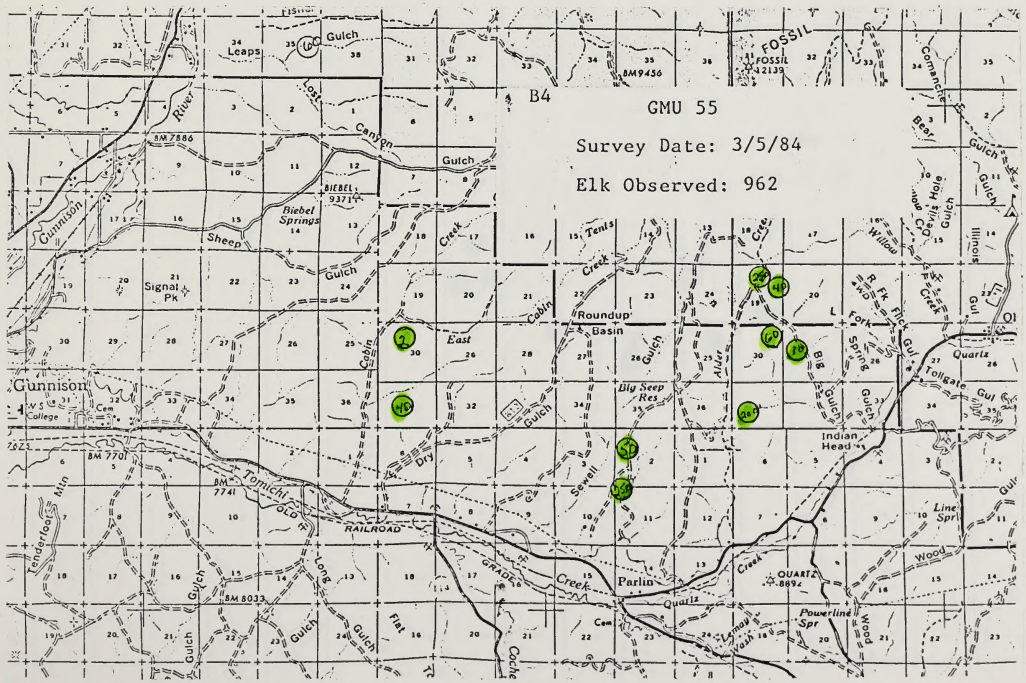
Parlin
Biebel Springs
Roundup Basin
Big Seep Res.
Indian Head
Tomichi
RAILROAD
FOSSIL


B4
GMU 55
Survey Date: 3/5/84
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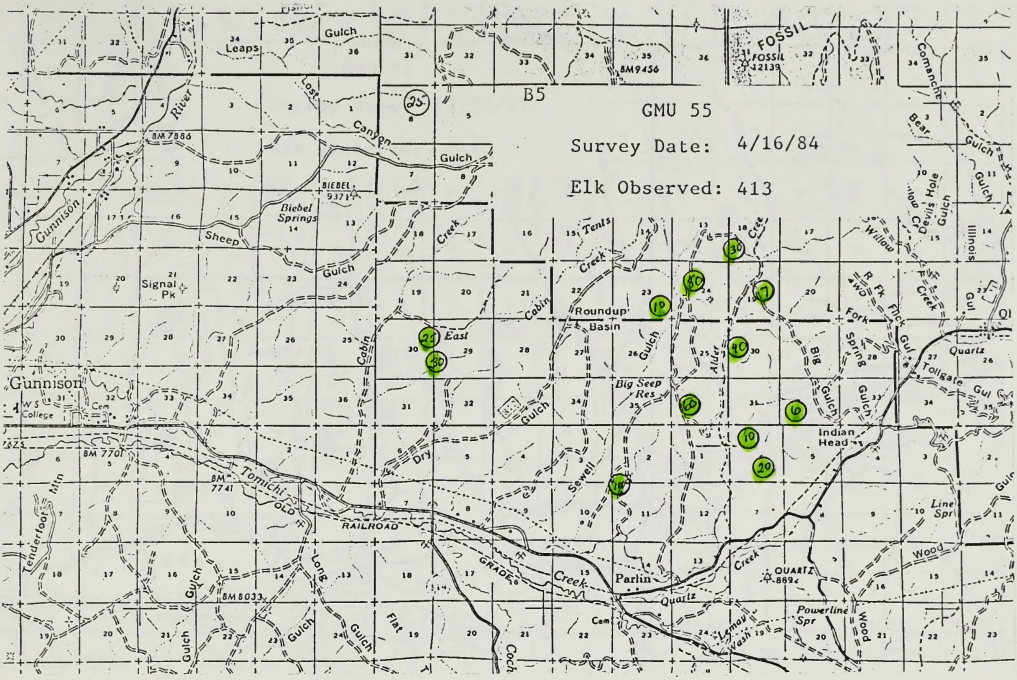
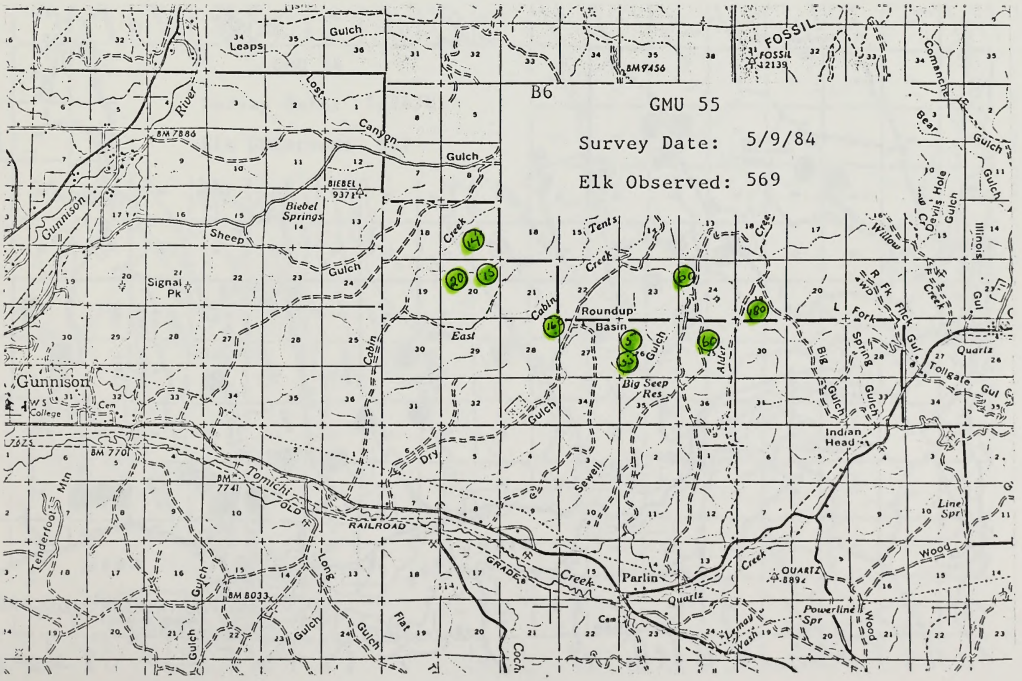
Parlin
Biebel Springs
Roundup Basin
Big Seep Res.
Indian Head
Tomichi
RAILROAD
FOSSIL


B5
GMU 55
Survey Date: 4/16/84
Elk Observed: 413
Gunnison
Parlin
Roundup Basin
Big Seep Res
Indian Head
Signal Pk
Biebel Springs
Tomichi
OLD RR
RAILROAD
GRADE
Sewell
Cabin
Sheep
Gulch
Creek
Tenderfoot Mtn
Quartz
Tollgate
Powerline Spr
FOSSIL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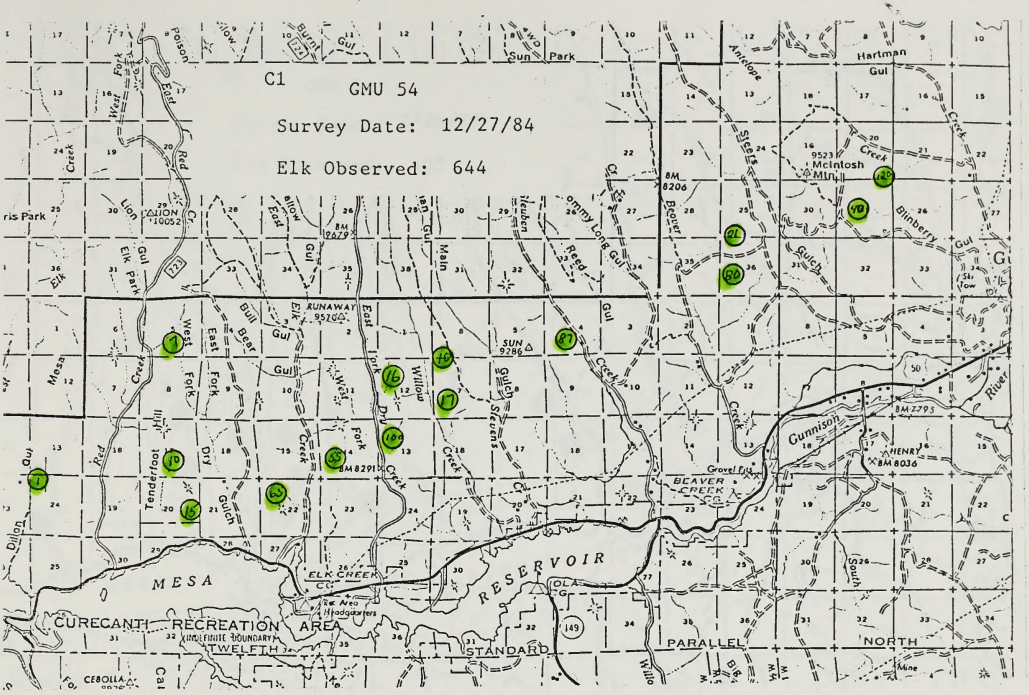
GMU 55
Survey Date: 5/9/84
Elk Observed: 569
Gunnison
Parlin
Roundup Basin
Big Seep Res
Indian Head
Signal Pk
Biebel Springs
Tomichi
OLD RR
RAILROAD
GRADE
Sewell
Cabin
Sheep
Gulch
Creek
Tenderfoot Mtn
Quartz
Tollgate
Powerline Spr
FOSSIL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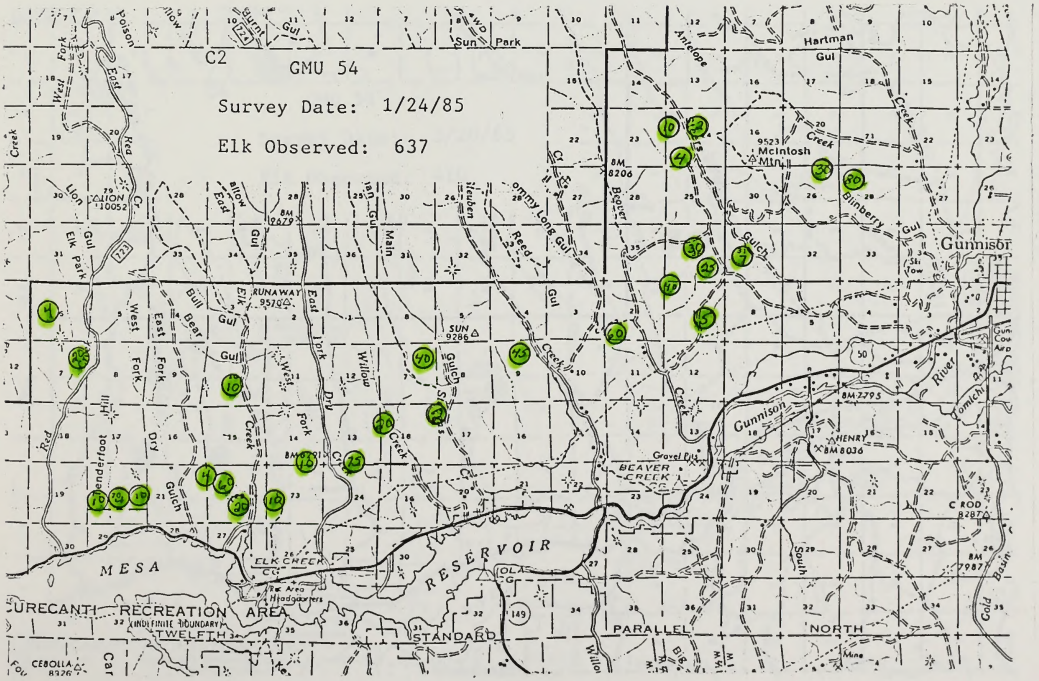
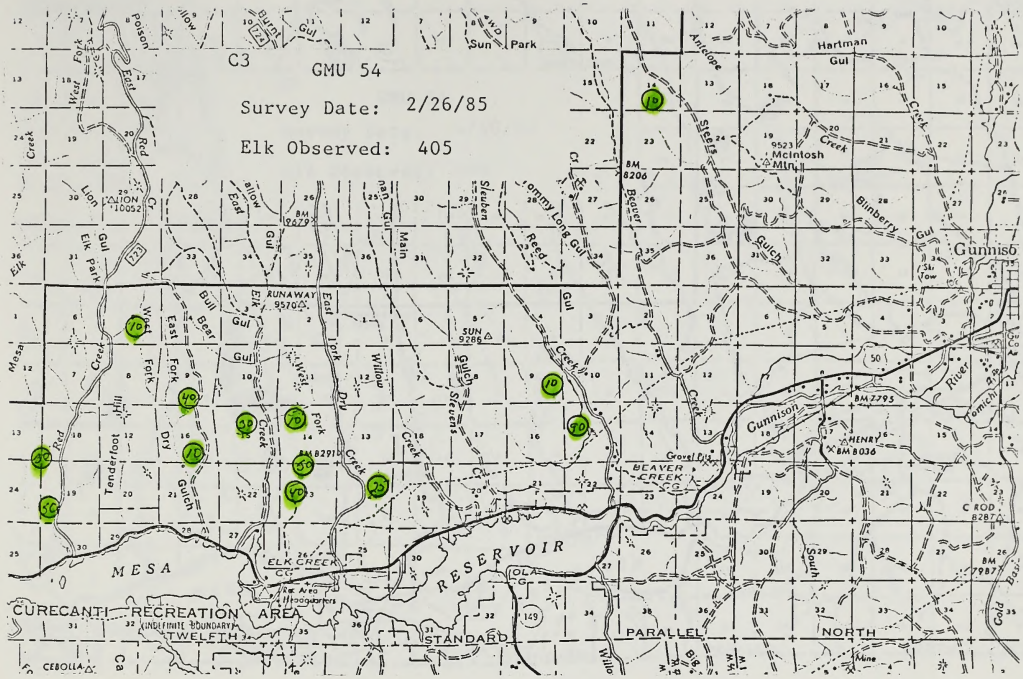
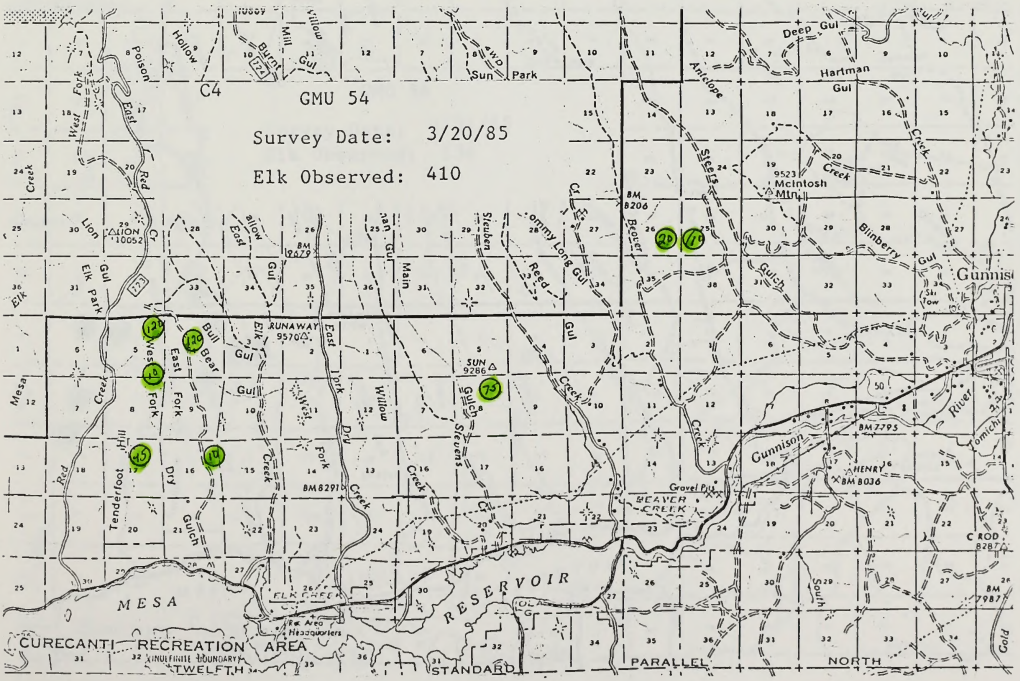
Survey Date: 12/27/84
Elk Observed: 644
McIntosh Mtn
RUNAWAY
SUN
BEAVER CREEK
ELK CREEK
RESERVOIR
MESA
CURECANTI RECREATION AREA
UNDEFINITE BOUNDARY
TWELFTH STANDARD PARALLEL NORTH
Gunnison
HENRY
Hartman Gul
Sun Park
Poison
Burnt Gul
Antelope
Steers
Blimberry
Beaver
Reed
Willow
Tenderfoot
Dillon
Cebolla


C2
GMU 54
Survey Date: 1/24/85
Elk Observed: 637
McIntosh Mtn
RUNAWAY
SUN
BEAVER CREEK
ELK CREEK
RESERVOIR
MESA
CURECANTI RECREATION AREA
UNDEFINITE BOUNDARY
TWELFTH STANDARD PARALLEL NORTH
Gunnison
HENRY
Hartman Gul
Sun Park
Poison
Burnt Gul
Antelope
Steers
Blimberry
Beaver
Reed
Willow
Tenderfoot
Dillon
Cebolla


C3
GMU 54
Survey Date: 2/26/85
Elk Observed: 405
Sun Park
Hartman Gul
Anticline
Sleeper
McIntosh Mtn
Blimberry
Gulch
Gunnison
Gunnison River
Lion
Elk Park
Elk
Mesa
Tenderfoot Hill
Dry Gulch
Bull Bear
Willow
Main
Steuben
Reed
Long Gul
Beaver Creek
Gravel Pit
HENRY
C ROD
RUNAWAY
SUN
ELK CREEK
Elk Ave Headquarters
RESERVOIR
MESA
CURECANTI RECREATION AREA
(INDEFINITE BOUNDARY)
TWELFTH STANDARD PARALLEL NORTH
CEBOLLA
Gold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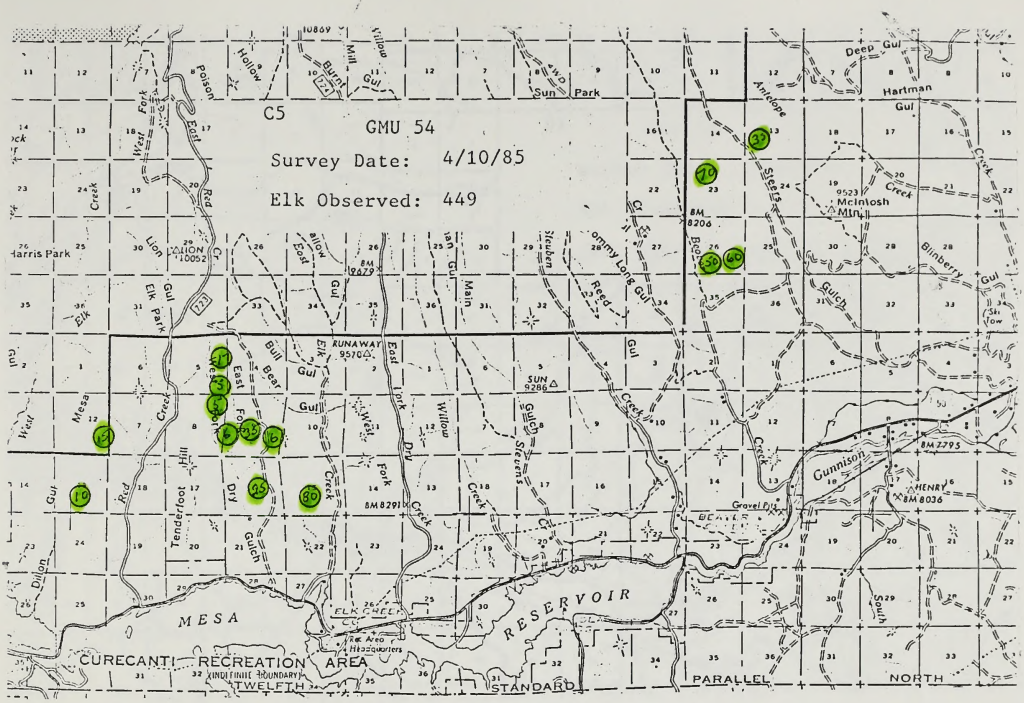
GMU 54
Survey Date: 3/20/85
Elk Observed: 410
Deep Gul
Sun Park
Hartman Gul
Anticline
Sleeper
McIntosh Mtn
Blimberry
Gulch
Gunnison
Gunnison River
Lion
Elk Park
Elk
Mesa
Tenderfoot Hill
Dry Gulch
Bull Bear
Willow
Main
Steuben
Reed
Long Gul
Beaver Creek
Gravel Pit
HENRY
C ROD
RUNAWAY
SUN
ELK CREEK
Elk Ave Headquarters
RESERVOIR
MESA
CURECANTI RECREATION AREA
(INDEFINITE BOUNDARY)
TWELFTH STANDARD PARALLEL NORTH
Gold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GMU 54
Survey Date: 4/10/85
Elk Observed: 449
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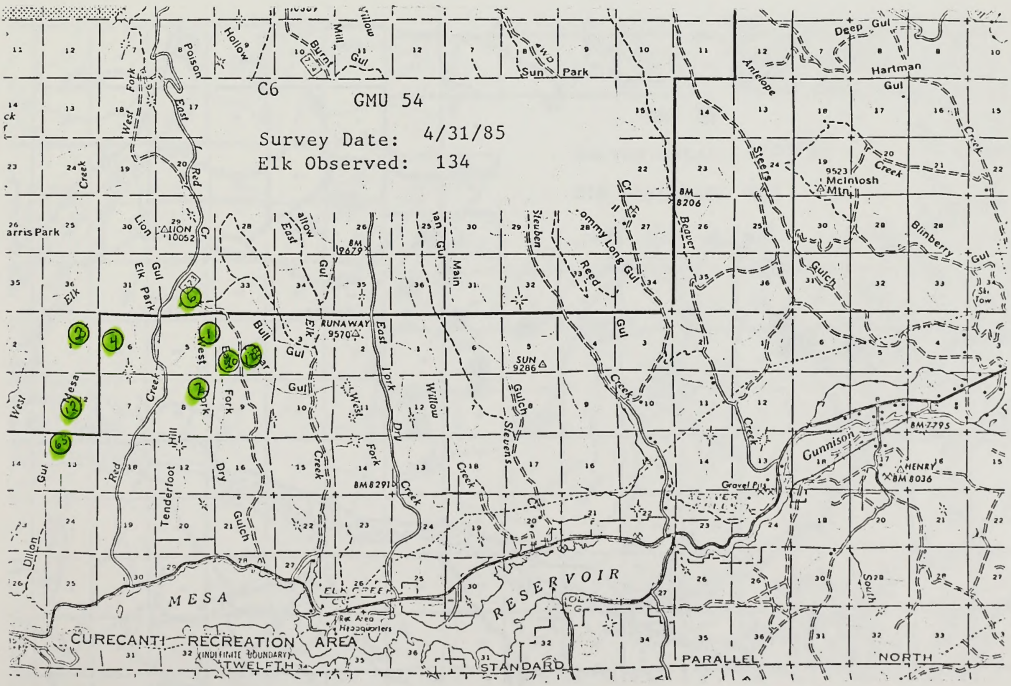
Sun Park
Hartman
Deep Gul
Antelope
McIntosh Mtn
Blinberry
Gulch
Runaway
Sun
Gunnison
Gravel Pit
Beaver
Henry
Mesa
Tenderfoot
Dry
Gulch
Elk Creek
Elk Creek Hq
Reservoir
Curecanti Recreation Area
Twelfth Standard Parallel North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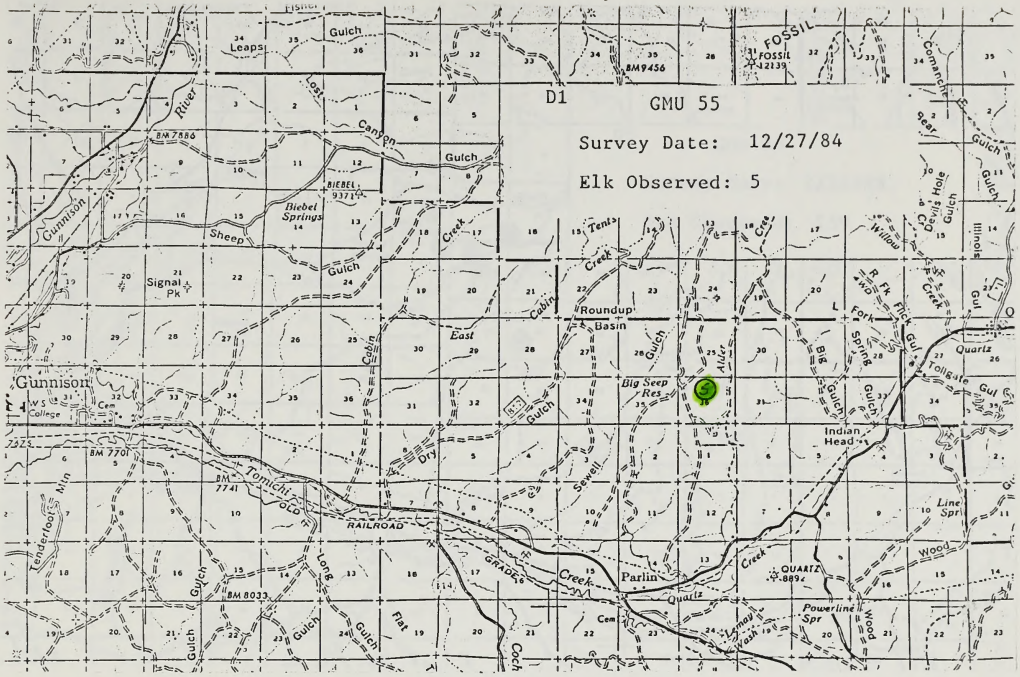
GMU 54
Survey Date: 4/31/85
Elk Observed: 134
Harris Park
Sun Park
Hartman
Deep Gul
Antelope
McIntosh Mtn
Blinberry
Gulch
Runaway
Sun
Gunnison
Gravel Pit
Beaver
Henry
Mesa
Tenderfoot
Dry
Gulch
Elk Creek
Elk Creek Hq
Reservoir
Curecanti Recreation Area
Twelfth Standard Parallel North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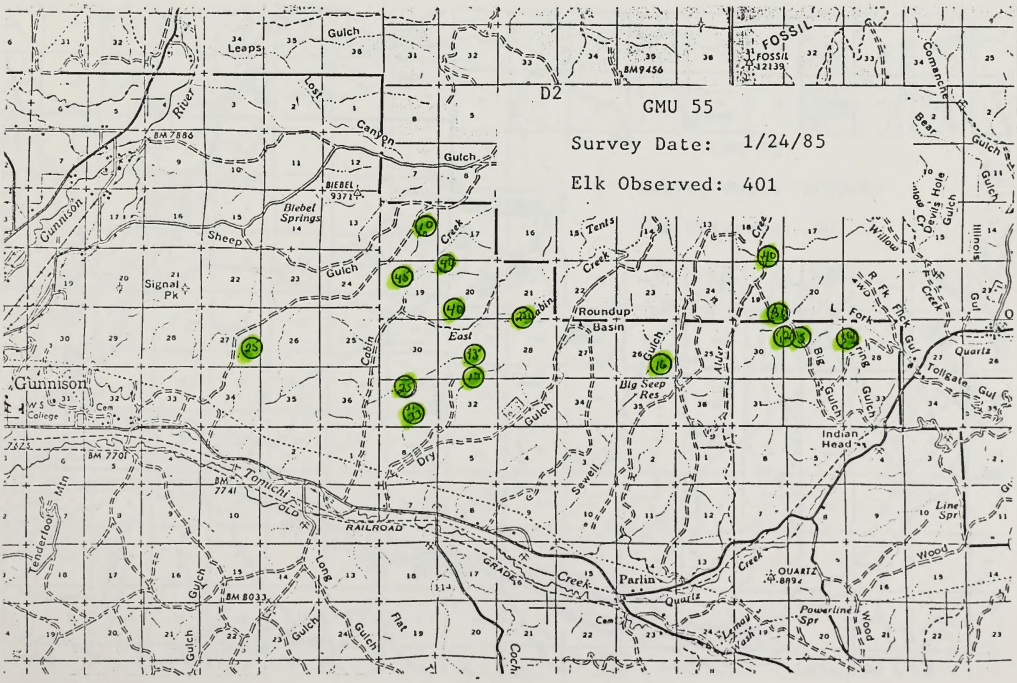
Survey Date: 12/27/84
Elk Observed: 5
Gunnison
Parlin
Roundup Basin
Big Seep Res
Indian Head
Signal Pk
Biebel Springs
Tomichi
Sheep
Gulch
Canyon
Lost
River
Cabin
East
Dry
Sewell
Long
Flat
Tenderfoot Mtn
OLD RAILROAD GRADE
Creek
Quartz
Powerline Spr
Tents
Willow
Alder
Big
Tollgate
Line Spr
Wood
Illinois
Hole
Beaver
Commercial
FOSSIL
Leaps
BM 7886
BM 7701
BM 7741
BM 8033
BM 9456
BIEBEL 9371
FOSSIL 12139
QUARTZ 8894
Cem
College


D2
GMU 55
Survey Date: 1/24/85
Elk Observed: 401
Gunnison
Parlin
Roundup Basin
Big Seep Res
Indian Head
Signal Pk
Biebel Springs
Tomichi
Sheep
Gulch
Canyon
Lost
River
Cabin
East
Dry
Sewell
Long
Flat
Tenderfoot Mtn
OLD RAILROAD GRADE
Creek
Quartz
Powerline Spr
Tents
Willow
Alder
Big
Tollgate
Line Spr
Wood
Illinois
Hole
Beaver
Commercial
FOSSIL
Leaps
BM 7886
BM 7701
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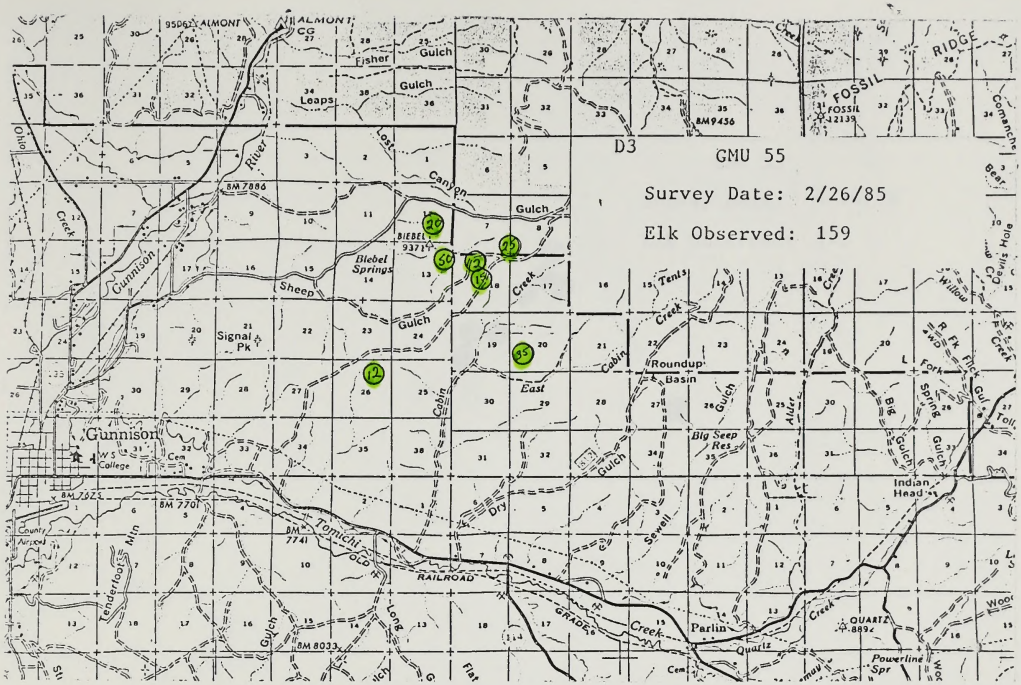
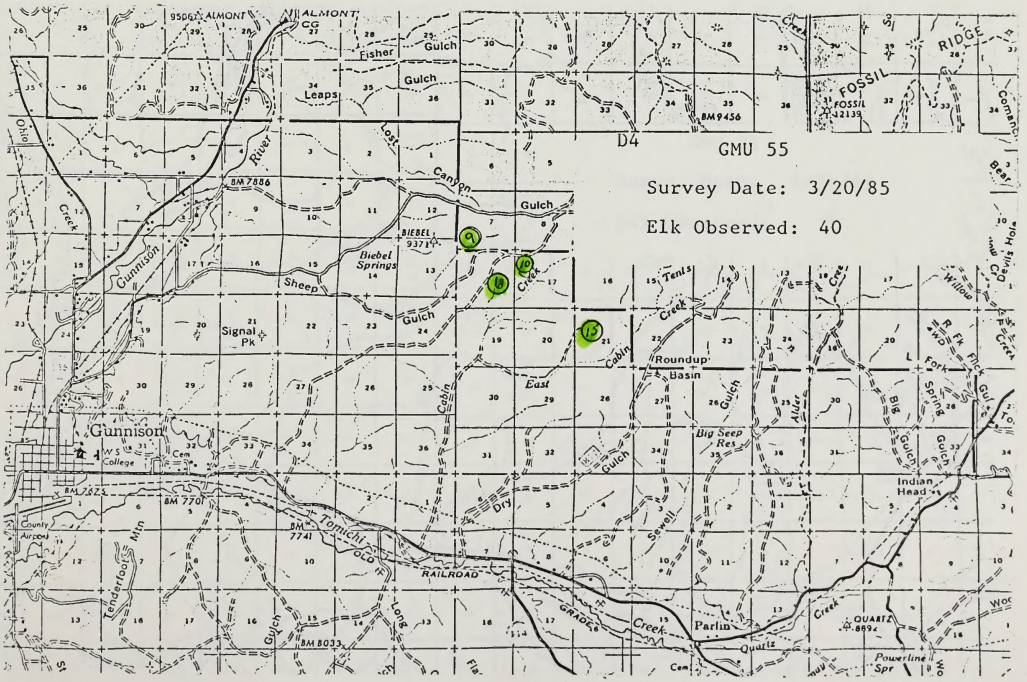
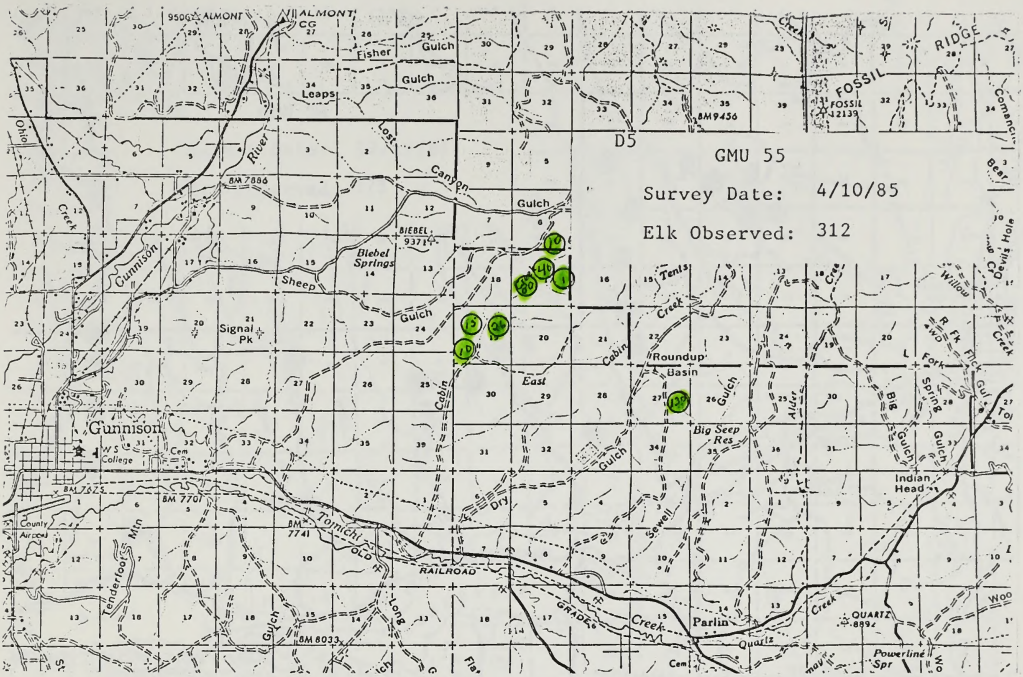
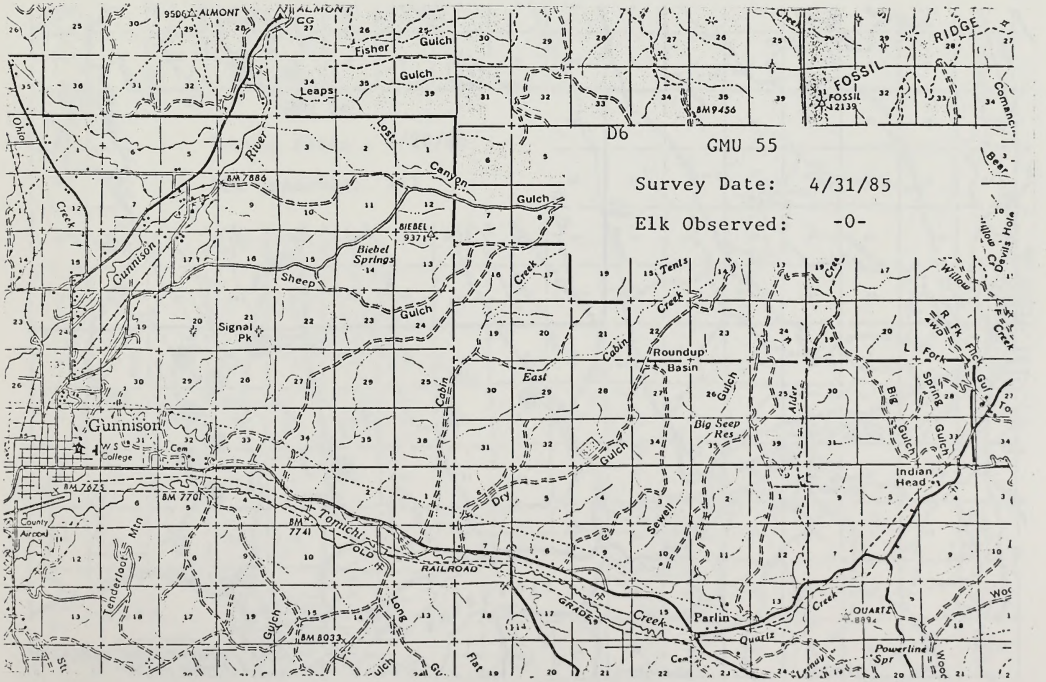
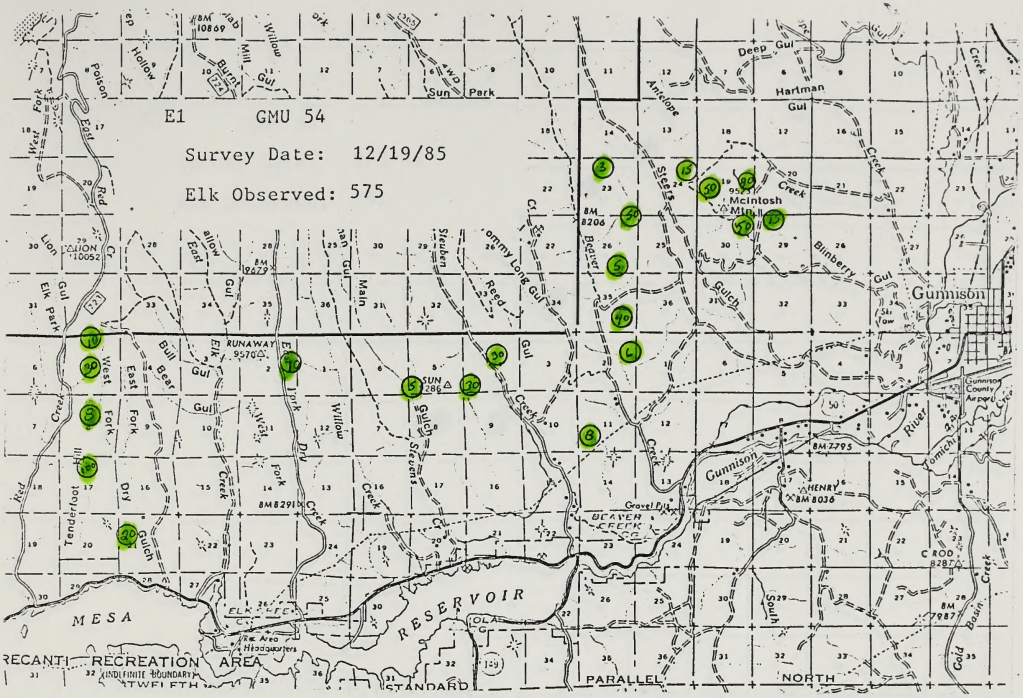
BM 8033
BM 9456
BIEBEL 9371
FOSSIL 12139
QUARTZ 8894
Cem
College

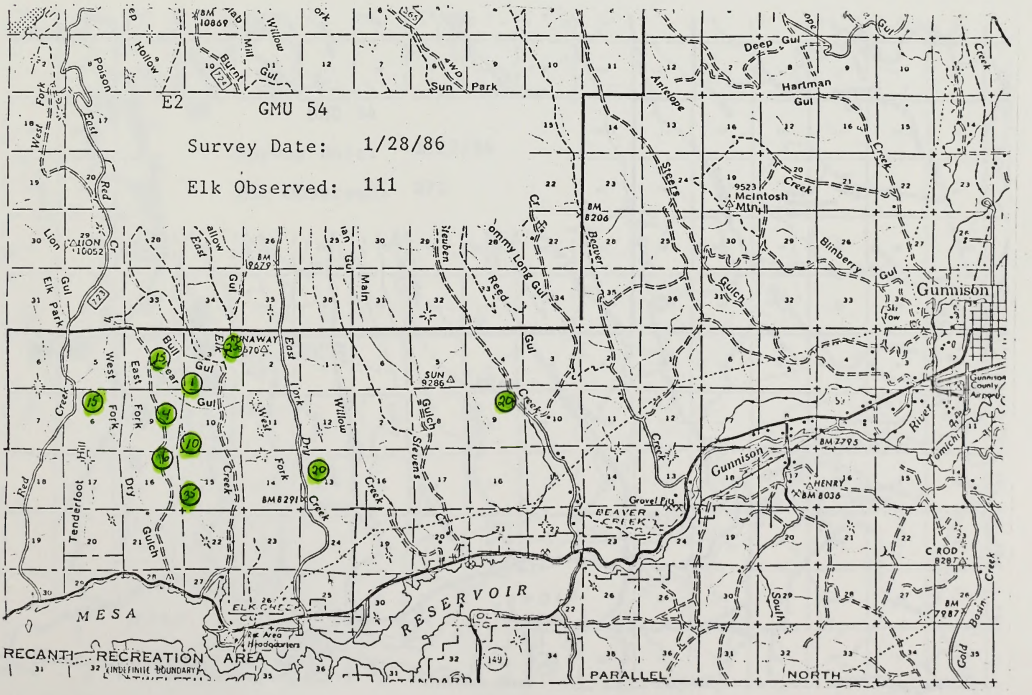

D3
GMU 55
Survey Date: 2/26/85
Elk Observed: 159
ALMONT
Fisher
Gulch
Leaps
FOSSIL
RIDGE
Lost
Canyon
River
Gunnison
Sheep
Gulch
Biebel Springs
BIEBEL
Signal Pk
Tents
Creek
Cabin
Roundup
Basin
East
Big Seep Res
Indian Head
Gunnison
Tomichi
OLD
RAILROAD
GRADE
Parlin
QUARTZ
Quartz
Powerline Spr
Tenderfoot Mtn
Long
Dry
Sewell
Alder
Willow
Big
Spring
Fork
Comanche
Beaver
Hole
Ohio
Creek

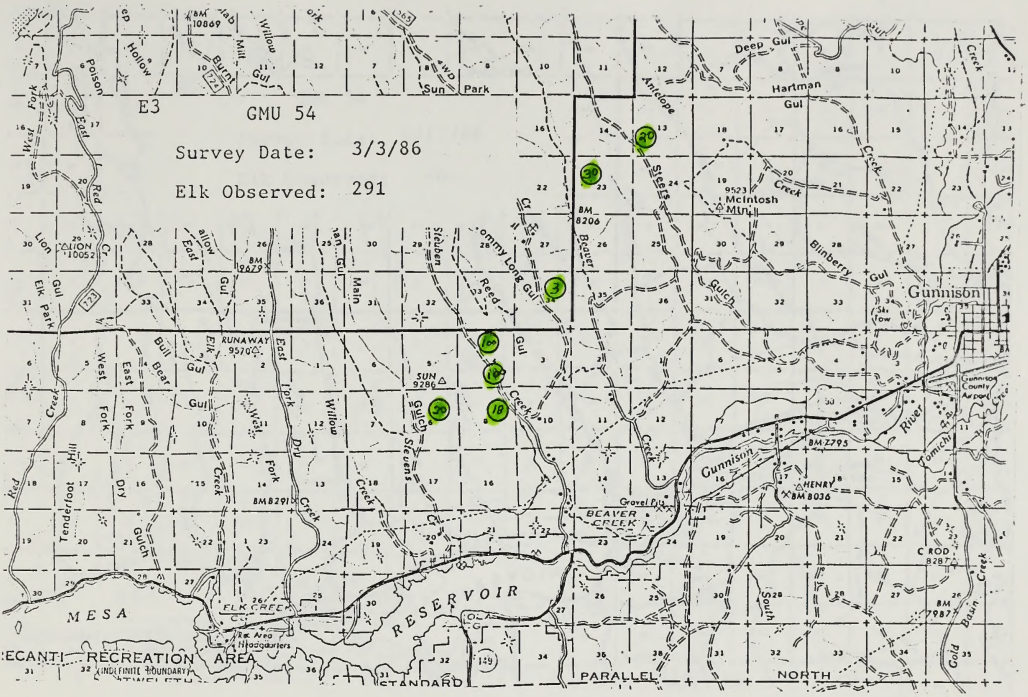

D4
GMU 55
Survey Date: 3/20/85
Elk Observed: 40
ALMONT
Fisher
Gulch
Leaps
FOSSIL
RIDGE
Lost
Canyon
River
Gunnison
Sheep
Gulch
Biebel Springs
BIEBEL
Signal Pk
Tents
Creek
Cabin
Roundup
Basin
East
Big Seep Res
Indian Head
Gunnison
Tomichi
OLD
RAILROAD
GRADE
Parlin
QUARTZ
Quartz
Powerline Spr
Tenderfoot Mtn
Long
Dry
Sewell
Alder
Willow
Big
Spring
Fork
Comanche
Beaver
Hole
Ohio
Creek

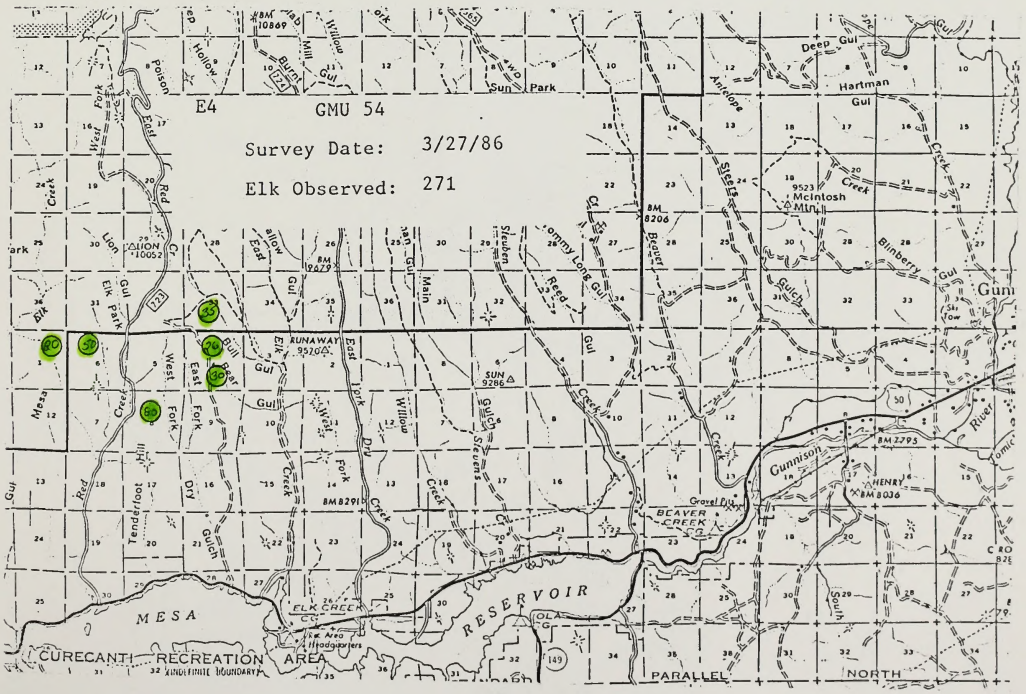

D5
GMU 55
Survey Date: 4/10/85
Elk Observed: 312
ALMONT
Fisher
Gulch
Leaps
FOSSIL
RIDGE
Lost
Canyon
Biebel Springs
Sheep
Signal Pk
Tents
Roundup
Basin
East
Big Seep Res
Gunnison
Indian Head
Tomichi
RAILROAD
GRADE
Parlin
QUARTZ
Powerline Spr
Tenderfoot Mtn
Cunnison
River
Cabin
Sewell
Alder
Big Spring
Willow
Creek

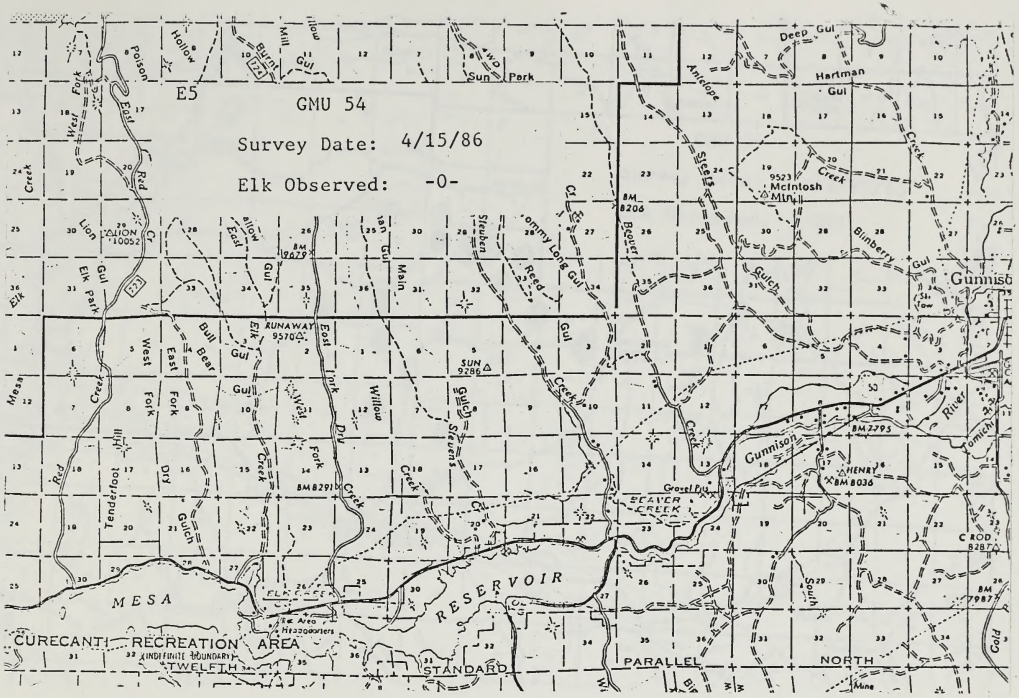

D6
GMU 55
Survey Date: 4/31/85
Elk Observed: -0-
ALMONT
Fisher
Gulch
Leaps
FOSSIL
RIDGE
Lost
Canyon
Biebel Springs
Sheep
Signal Pk
Tents
Roundup
Basin
East
Big Seep Res
Gunnison
Indian Head
Tomichi
RAILROAD
GRADE
Parlin
QUARTZ
Powerline Spr
Tenderfoot Mtn
Cunnison
River
Cabin
Sewell
Alder
Big Spring
Willow
Creek

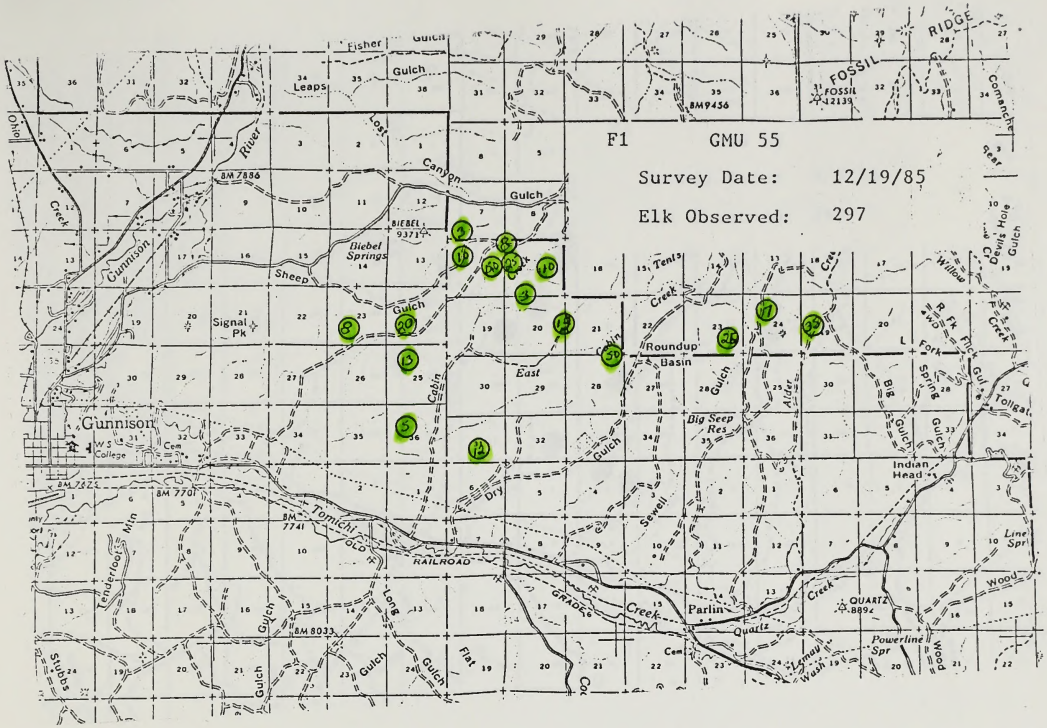

E1
GMU 54
Survey Date: 12/19/85
Elk Observed: 575
Gunnison
McIntosh Mtn
RUNAWAY
SUN
HENRY
BEAVER CREEK
RESERVOIR
MESA
RECANTI RECREATION AREA
STANDARD
PARALLEL
NORTH

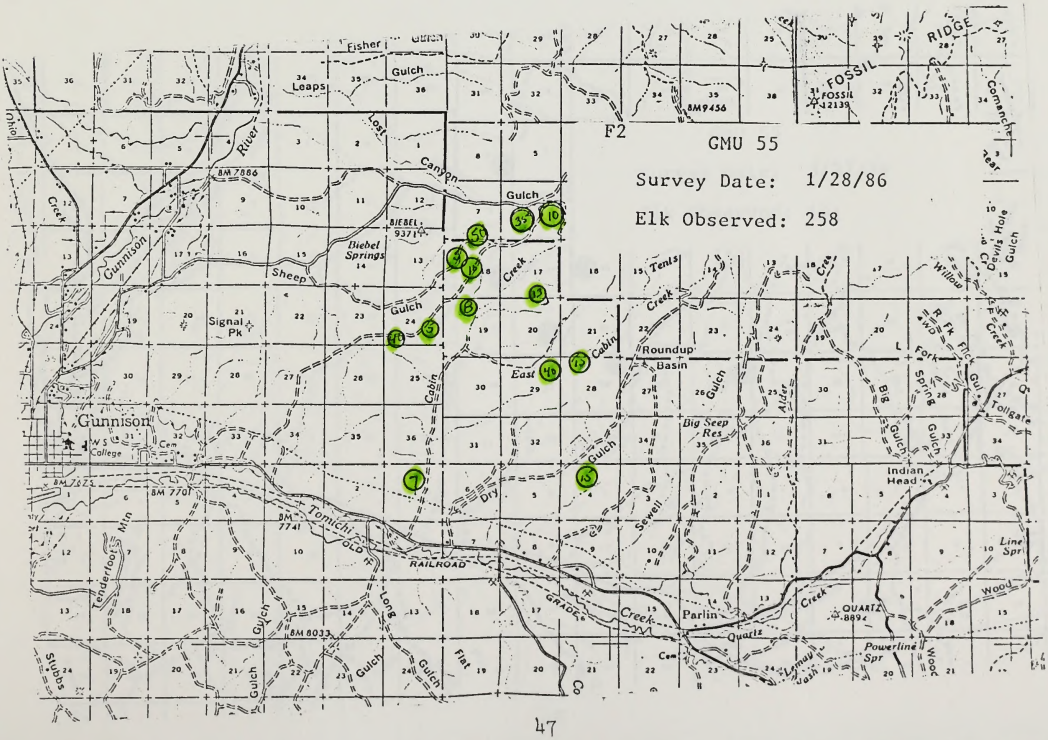

E2
GMU 54
Survey Date: 1/28/86
Elk Observed: 111
Gunnison
McIntosh Mtn
RUNAWAY
SUN
HENRY
BEAVER CREEK
RESERVOIR
MESA
RECANTI RECREATION AREA
PARALLEL
NORTH

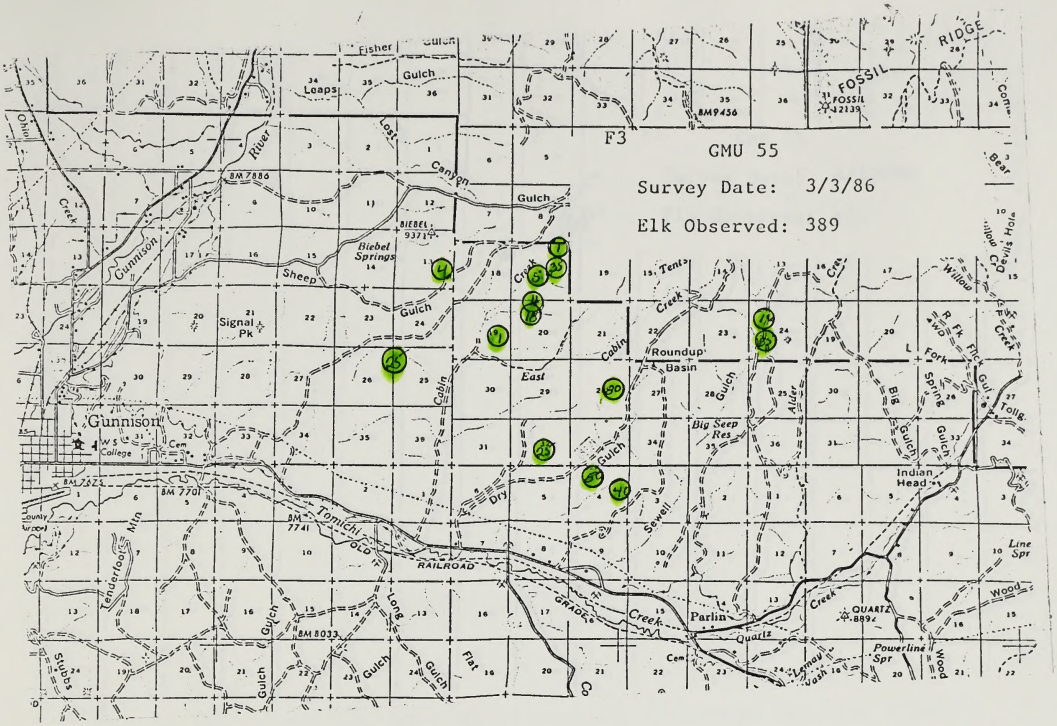

E3
GMU 54
Survey Date: 3/3/86
Elk Observed: 291
Gunnison
McIntosh Mtn
Sun Park
Hartman Gul
Deep Gul
Antelope
Steers
Beaver
Blimberry
Gulch
Creek
Tommy Long Gul
Steuben
Reed
Main
Willow
East Fork
Dry
Tenderfoot
Hill
Red
Poison
Hollow
Burns
Mill
Lion
Elk Park
West Fork
Bull
Beaver
RUNAWAY
SUN
Gunnison
River
Tomichi
HENRY
Gravel Pit
BEAVER CREEK
RESERVOIR
ELK CREEK
Elk Area Headquarters
MESA
CURECANTI RECREATION AREA
(INDEFINITE BOUNDARY)
STANDARD
PARALLEL
NORTH
Cold Basin
Creek

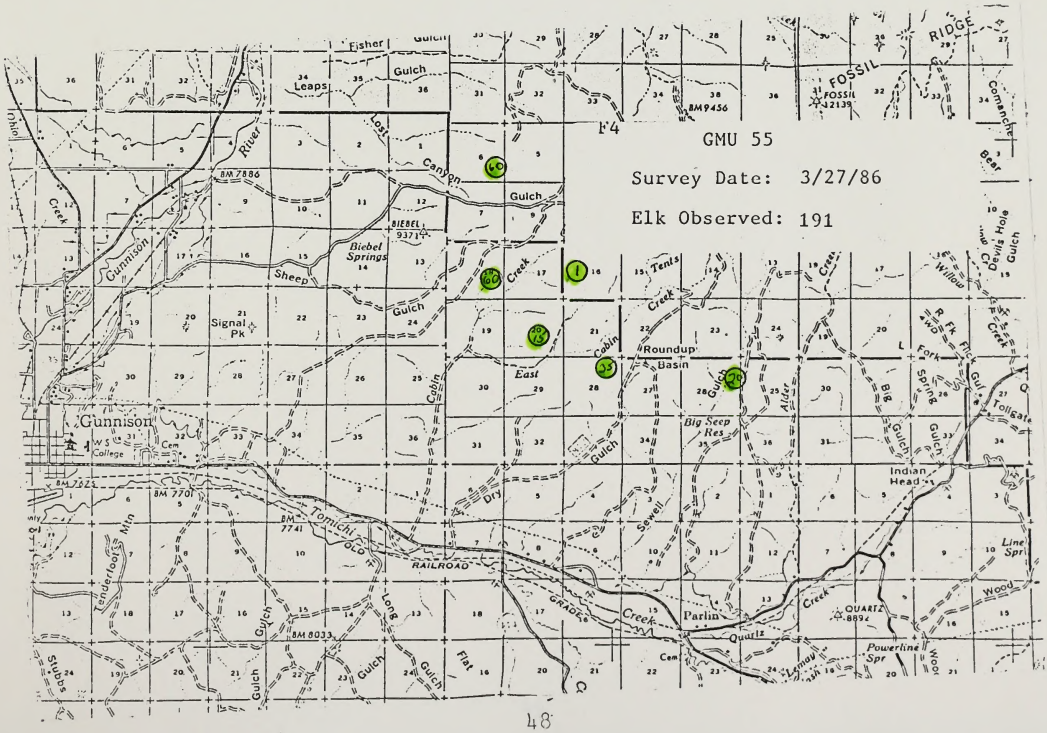

E4
GMU 54
Survey Date: 3/27/86
Elk Observed: 271
McIntosh Mtn
Sun Park
Hartman Gul
Deep Gul
Antelope
Steers
Beaver
Blimberry
Gulch
Creek
Tommy Long Gul
Steuben
Reed
Main
Willow
East Fork
Dry
Tenderfoot
Hill
Red
Poison
Hollow
Burns
Mill
Lion
Elk Park
West Fork
Bull
Beaver
RUNAWAY
SUN
Gunnison
River
Tomichi
HENRY
Gravel Pit
BEAVER CREEK
RESERVOIR
ELK CREEK
Elk Area Headquarters
MESA
CURECANTI RECREATION AREA
(INDEFINITE BOUNDARY)
PARALLEL
NORTH

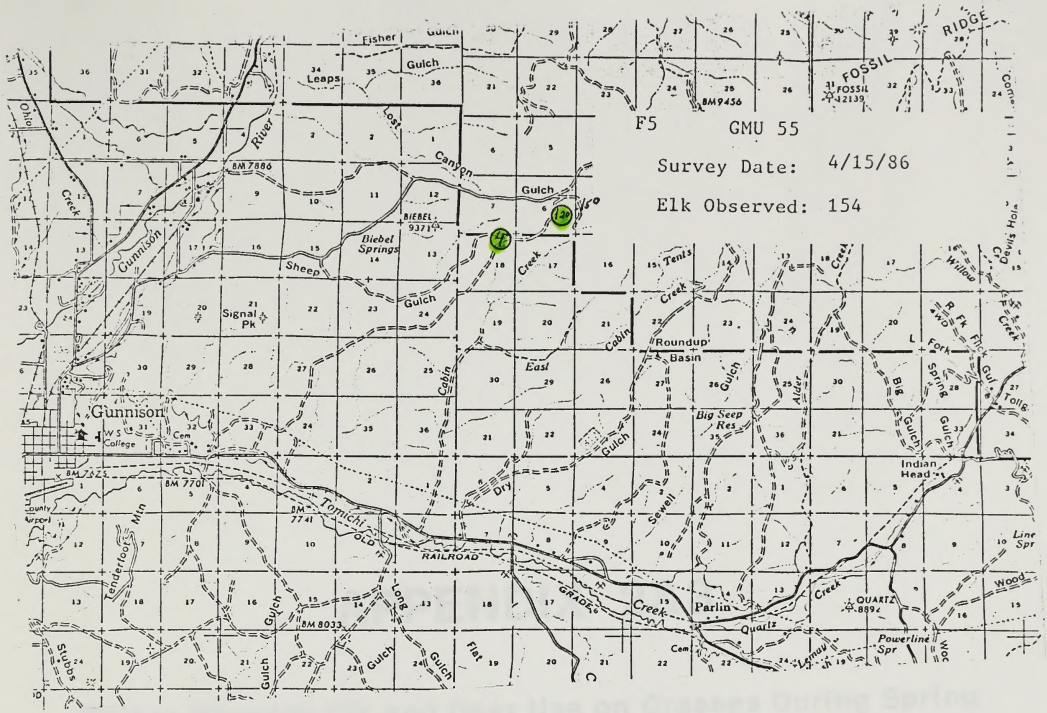

E5
GMU 54
Survey Date: 4/15/86
Elk Observed: -0-
Deep Gul
Hartman
Gul
McIntosh
Mtn
Gunnison
Gunnison
RUNAWAY
SUN
BEAVER
CREEK
RESERVOIR
MESA
CURECANTI RECREATION AREA
TWELFTH STANDARD PARALLEL NORTH


F1
GMU 55
Survey Date: 12/19/85
Elk Observed: 297
Gunnison
Parlin
Roundup Basin
Big Seep Res.
Indian Head
Signal Pk
Biebel Springs
Fossil Ridge
Tomichi Creek
Gunnison River
Sewell Creek
Quartz Creek
Powerline Spr
Lost Canyon
Sheep Gulch
Cabin Gulch
Alder Gulch
Big Spring Gulch
Tollgate Gulch
Devils Hole Gulch
Willow Creek
Tents Creek
Fisher Gulch
Leaps Gulch
Long Flat Gulch
Stubbs Gulch
Lenderfoot Mtn
Ohio Creek
Commanche Gear
Lymon Wash
Wood Gulch
Line Spr
Dry Gulch
Old Railroad Grade
BM 7886
BM 7822
BM 7701
BM 7741
BM 8033
BM 9456
BIEBEL 9371
FOSSIL 12139
QUARTZ 8894


F2
GMU 55
Survey Date: 1/28/86
Elk Observed: 258
Gunnison
Parlin
Roundup Basin
Big Seep Res.
Indian Head
Signal Pk
Biebel Springs
Fossil Ridge
Tomichi Creek
Gunnison River
Sewell Creek
Quartz Creek
Powerline Spr
Lost Canyon
Sheep Gulch
Cabin Gulch
Alder Gulch
Big Spring Gulch
Tollgate Gulch
Devils Hole Gulch
Willow Creek
Tents Creek
Fisher Gulch
Leaps Gulch
Long Flat Gulch
Stubbs Gulch
Lenderfoot Mtn
Ohio Creek
Commanche Gear
Lymon Wash
Wood Gulch
Line Spr
Dry Gulch
Old Railroad Grade
BM 7886
BM 7822
BM 7701
BM 7741
BM 8033
BM 9456
BIEBEL 9371
FOSSIL 12139
QUARTZ 8894


F3
GMU 55
Survey Date: 3/3/86
Elk Observed: 389
Gunnison
Signal Pk
Biebel Springs
Roundup Basin
Big Seep Res
Indian Head
Parlin
Tomichi
OLD RAILROAD GRADE
Tenderloin Mtn
Fossil Ridge


F4
GMU 55
Survey Date: 3/27/86
Elk Observed: 191
Gunnison
Signal Pk
Biebel Springs
Roundup Basin
Big Seep Res
Indian Head
Parlin
Tomichi
OLD RAILROAD GRADE
Tenderloin Mtn
Fossil Ridge


F5
GMU 55
Survey Date: 4/15/86
Elk Observed: 154
Gunnison
Signal Pk
Biebel Springs
Roundup Basin
Big Seep Res
Indian Head
Parlin
Quartz
Powerline Spr
Tomichi
RAILROAD
GRADE
Sheep Gulch
Cabin Creek
Dry Gulch
Sewell Gulch
Long Gulch
Flat Gulch
Stubbs
Tenderfoot Mtn
Gunnison River
Ohio Creek
Fisher Gulch
Leaps Gulch
Lost Canyon
Tents Creek
Willow Creek
Big Spring Gulch
Fossil Ridge
BM 7886
BM 7525
BM 7701
BM 7741
BM 8033
BM 9456
BIEBEL 9371
FOSSIL 12139
QUARTZ 8894
Cem
W S College

APPENDIX 2&3

Photos Showing Elk and Deer Use on Grasses During Spring

Note: Condition and abundance of seed head production on grasses. Use by elk and deer are not detectible.

May 24, 1984

May 24, 1984

End of May 1985.

**Photos were taken at two different locations in the Resource Area.

End of May 1985. Note: No use in upper photo, and sparse use in lower. Photos show typical hit and miss type elk and deer grazing.

May 10, 1986

May 5, 1986. Grasses show no sign of use; this is the typical use pattern by elk and deer throughout the winter range.

Protective cage 1. Demonstrates the vegetative growth of an area along the riparian zone protected from all grazing.

Protective cage 2. Demonstrates the vegetative growth along a riparian zone that had the influence of elk grazing. Vegetative growth is virtually the same as that of the total protective cage above.

Area 3 shows the influence of cattle grazing. No elk are in this pasture during this time.

11/89 R20

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1989

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8-13	
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